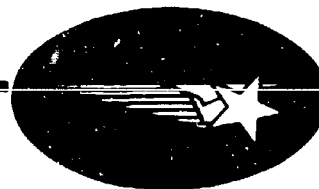


3-27-67-1 • VOL. 1 • MAY 1967

3-27-67-1 • VOL. 1



AD 654054

DASA 1971-1

THERMAL RADIATION PHENOMENA

VOL. 1

THE EQUILIBRIUM THERMODYNAMIC
PROPERTIES OF HIGH TEMPERATURE AIR

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DASA 1971-1
3-27-67-1 Vol 1
May 1967

THERMAL RADIATION PHENOMENA

**The Equilibrium Thermodynamic
Properties of High Temperature Air**

by

Forrest R. Gilmore

Edited by

John L. Magee and Henry Aroeste

Open Publication was approved by the Department of Defense on 3 April 1967

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FOREWORD

"Thermal radiation" is electromagnetic radiation emitted by matter in a state of thermal excitation. The energy density of such radiation in an enclosure at constant temperature is given by the well known Planck formula. The importance of thermal radiation in physical problems increases as the temperature is raised; at moderate temperatures (say, thousands of degrees Kelvin) its role is primarily one of transmitting energy, whereas at high temperatures (say, millions of degrees Kelvin) the energy density of the radiation field itself becomes important as well. If thermal radiation must be considered explicitly in a problem, the radiative properties of the matter must be known. In the simplest order of approximation, it can be assumed that the matter is in thermodynamic equilibrium "locally" (a condition called local thermodynamic equilibrium, or LTE), and all of the necessary radiative properties can be defined, at least in principle. Of course whenever thermal radiation must be considered, the medium which contains it inevitably has pressure and density gradients and the treatment requires the use of hydrodynamics. Hydrodynamics with explicit consideration of thermal radiation is called "radiation hydrodynamics".

In the past twenty years or so, many radiation hydrodynamic problems involving air have been studied. In this work a great deal of effort has gone into calculations of the equilibrium properties of air. Both thermodynamic and radiative properties have been calculated. It has been generally believed that the basic theory is well enough understood that such calculations yield valid results, and the limited experimental checks which are possible seem to support this hypothesis. The advantage of having sets of tables which are entirely calculated is evident: the calculated quantities are self-consistent on the basis of some set of assumptions, and they can later be improved if calculational techniques are improved, or if better assumptions can be made.

The origin of this set of books was in the desire of a number of persons interested in the radiation hydrodynamics of air to have a good source of reliable information on basic air properties. A series of books dealing with both theoretical and practical aspects was envisaged. As the series materialized, it was thought appropriate to devote the first three volumes to the equilibrium properties of air. They are:

The Equilibrium Thermodynamic Properties of Air,
by F. R. Gilmore

The Radiative Properties of Heated Air,
by B. H. Armstrong and R. W. Nicholls

Tables of Radiative Properties of Air,
by Lockheed Staff

The first volume contains a set of tables along with a detailed discussion of the basic models and techniques used for their computation. Because of the size of the related radiative tables and text, two volumes were considered necessary. The first contains the text, and the second the tables. It is hoped that these volumes will be widely useful, but because of the emphasis on very high temperatures it is clear that they will be most attractive to those concerned with nuclear weapons phenomenology, reentry vehicles, etc.

Our understanding of kinetic phenomena, long known to be important and at present in a state of rapid growth, is not as easy to assess as are equilibrium properties. Severe limitations had to be placed on choice of material. One volume is offered at this time:

Excitation and Non Equilibrium Phenomena in Air,
by Landshoff, et al.

It provides material on the more important processes involved in the excitation of air, criteria for the validity of LTE and special radiative effects.

A discussion of radiation hydrodynamics was felt to be necessary and another volume was planned to deal with this topic:

Radiation Hydrodynamics of High Temperature Air,
by Landshoff, Hillendahl, et al.

It is not ready for publication at this time. It will review the basic theory of radiation hydrodynamics and discuss the application to fireballs in the atmosphere.

The choice of material for these last two volumes was made with an eye to the needs of the principal users of the other three volumes.

Most of the work on which these volumes are based was supported by the United States Government through various agencies of the Defense Department and the Atomic Energy Commission. The actual preparation of the volumes was largely supported by the Defense Atomic Support Agency.

We are indebted to many authors and organizations for assistance and we gratefully acknowledge their cooperation. We are particularly grateful to the RAND Corporation for permission to use works of F. R. Gilmore and H. L. Brode and to the IBM Corporation for permission to use some of the work of B. H. Armstrong. Most of the other authors are employed by the Lockheed Missiles and Space Company, in some cases as consultants.

Finally we would like to acknowledge the key role of Dr. R. E. Meyerott of LMSC in all of this effort, from the initial conception to its realization. We are particularly grateful to him for his constant advice and encouragement.

Criticism and constructive suggestions are invited from all readers of these books. We understand that much remains to be done in this field, and we hope that the efforts represented by this work will be a stimulus to its development.

The Editors

J. L. Magee

H. Arceste

Preface

This volume is concerned with the thermodynamic properties of air as well as individual air constituents from 1000°K to 10^7°K for densities between 10 and 10^{-7} times sea level density. It consists of text and tables which were both prepared by Dr. Forrest R. Gilmore. He is also the author of a somewhat smaller work (Gilmore, 1955) on the same topic which has received wide circulation.

The text describes the techniques, models and approximations used in calculation of the tables. It is not intended to be a general treatment of the theory of such calculations which is too well known to need restatement. The reader is expected to have some familiarity with both thermodynamics and statistical mechanics. Discussion of the approximations is detailed enough so that the accuracy can be readily assessed and improvements can be readily considered.

The tables can be accepted as an accurate summary of the thermodynamic properties of air and its constituents. They have been compared with other calculations (which differ in various approximations) and, where possible, with experiment. Of all inputs for calculations of hydrodynamics and radiation hydrodynamics, the equilibrium thermodynamic properties are by far the most reliable. It is unlikely that there will be a significant improvement of our knowledge in this area in the near future, nor is it needed, except perhaps at the highest density considered.

Information provided in the tables is much more widely useful than for air problems alone. It should be noted that most of the tables are devoted to the individual air constituents.

The air of this volume is a mixture of about 78% N_2 , 21% O_2 , 1% Ar, with a trace of CO_2 . It is essentially the air (i.e., dry air) found in the

homosphere, or the atmosphere below 95 kilometers altitude. In the homosphere, mixing processes are rapid, and the composition remains essentially constant. The local thermodynamic equilibrium (LTE) approximation of radiation hydrodynamics is reasonable only in the homosphere. For convenience of the reader a discussion of properties of the atmosphere prepared by A. D. Anderson is included as Appendix A.

We would like to thank Dr. Forrest R. Gilmore for his splendid cooperation and the RAND Corporation for permission to include this work in our series on "Thermal Radiation." Thanks are also due Mr. A. D. Anderson for preparation of Appendix A.

J. L. Magee

H. Aroeste

Contents

Chapter 1.	The Equilibrium Thermodynamic Properties of High-Temperature Air: Discussion (F.R. Gilmore)	1
1.1	Introduction	1
1.2	Air as a mixture of ideal gases in chemical equilibrium	2
1.3	Ideal gas properties for monatomic gases	10
1.4	Ideal gas properties for diatomic gases	21
1.5	Ideal gas properties for polyatomic gases	31
1.6	Effects of interparticle forces on the thermodynamic properties of air	32
1.7	Effects of Coulomb forces on the thermodynamic properties of air	40
1.8	Equilibrium calculations and results for air	44
Chapter 2.	The Equilibrium Thermodynamic Properties of High-Temperature Air: Tables and Graphs (F.R. Gilmore)	59
Appendix A	Composition and Properties of the Atmosphere. (A.D. Anderson)	311

CHAPTER 1. THE EQUILIBRIUM THERMODYNAMIC PROPERTIES OF HIGH-TEMPERATURE AIR: DISCUSSION

1.1 Introduction

In order to calculate the behavior of nuclear fireballs and of hypersonic missiles and meteorites, one needs values for the thermodynamic properties of air over a wide range of temperatures and pressures or densities. At temperatures above about 2000°K there are great experimental difficulties in measuring these properties directly, while it is generally accepted that careful theoretical calculations can yield results of high accuracy. Consequently, in this chapter the methods and data available for the theoretical computation of such properties are outlined, and published results reviewed briefly. Some improvements over existing treatments are also indicated. Extensive tables based on these improved expressions are given in Chapter 2.

Throughout this chapter the assumption of local thermodynamic equilibrium (LTE) is made. In some situations of interest, such as fireballs or missile trails at very high altitudes, this assumption is not valid, and the results given in this chapter are not applicable. In such non-equilibrium situations the thermodynamic properties of air depend upon the energy deposition mechanisms and the subsequent atomic and molecular processes, as discussed in a companion volume of Thermal Radiation Phenomena, Excitation and Non-equilibrium Phenomena in Air.

1.2 Air as a mixture of ideal gases in chemical equilibrium

The thermodynamic properties of most gases at low and moderate densities can be approximated over a certain temperature range by a thermal equation of state of the form

$$pV = NRT \quad (1.2-1)$$

and a caloric equation of state of the form

$$E = NC_vT, \quad (1.2-2)$$

where p is the pressure, V the volume, N the number of moles, R the gas constant per mole, T the temperature, E the internal energy, and C_v the (constant) molal specific heat at constant volume. A gas which satisfies Eq. (1.2-1) and Eq. (1.2-2) is called a perfect gas. Many gases satisfy Eq. (1.2-1) over a fairly wide range of temperatures, but Eq. (1.2-2) only over a much narrower range. Consequently, the definition of a perfect gas is sometimes modified to include gases which obey Eq. (1.2-1) but not Eq. (1.2-2). However, to avoid ambiguity it seems preferable to follow thermochemical practice, and use the phrase ideal gas to denote a gas which is thermally perfect but has an internal energy varying arbitrarily with the temperature.

Ideal-gas thermodynamic properties for many pure elements and compounds have been calculated and tabulated by various workers. The most extensive and accurate set of such tables was recently issued by

a Joint Army-Navy-Air Force (JANAF) Thermochemical Panel in loose leaf form (JANAF Thermochemical Tables, 1960), with revisions issued periodically. These tables include values for most air molecules to 6000°K. Methods for making such calculations at still higher temperatures will be discussed in later sections of this chapter.

Air is a mixture of nitrogen and oxygen, with small amounts of argon, carbon dioxide, and rare gases, and a variable amount of water vapor. At low and moderate densities its thermodynamic properties may be obtained simply by adding the ideal-gas contributions from its components. This is straightforward at low temperatures, where the composition does not change. At high temperatures, however, dissociation and other chemical reactions cause the composition to vary with temperature and pressure. Because of this variation the product pV for the mixture is no longer proportional to T , even though each component is effectively ideal. Consequently, aerodynamicists often call air at high temperatures a "real gas," although thermochemists prefer to reserve this term for high densities where intermolecular forces cause deviations from ideal-gas behavior.

The first step in calculating the thermodynamic properties of high-temperature air is usually to calculate the equilibrium chemical composition. The basic condition for chemical equilibrium (Epstein, 1937) is that at a fixed temperature and pressure the amounts or concentrations of the various chemical species must be such as to minimize the Gibbs free energy of the mixture, subject to conservation of the chemical elements in the mixture. If the temperature is high enough to produce significant ionization, electrons and ions must be included among the species, and charge must also be conserved.

The Gibbs free energy of an ideal-gas mixture is given by

$$F_{\text{tot}} = \sum_i N_i (F_i^{\circ} + RT \ln p_i) , \quad (1.2-3)$$

where N_i is the number of moles of the i -th species, F_i° is the ideal-gas molal free energy of this species (at the temperature T and one atmosphere pressure), and p_i is its partial pressure (in atmospheres). White, Johnson, and Dantzig (1958) have developed numerical methods for minimizing Eq. (1.2-3) while keeping the temperature and the total pressure fixed and conserving mass. Their methods are convenient for calculating equilibrium compositions at specified temperatures and pressures. For fireball applications it is preferable to make computations at specified temperatures and volumes (or densities), because the air density within a fireball varies by two or three orders of magnitude at most, while the pressure variation can be several more orders of magnitude. A convenient procedure for such computations can be based on the thermodynamic principle of minimizing the Helmholtz free energy (or work function)

$$A_{\text{tot}} = F_{\text{tot}} - pV = \sum_i N_i [F_i^{\circ} - RT + RT \ln (N_i RT/V)] , \quad (1.2-4)$$

at a fixed temperature and volume (Epstein, 1937). Since Eq. (1.2-4) has nearly the same form as Eq. (1.2-3), the procedures of White, Johnson and Dantzig (1958) can be used with only minor modification.

For systems involving a limited number of reactions, or for more complex systems if a high-speed computer is not available, a computation

method based on "equilibrium constants" may be more convenient. To derive the necessary equations from the free-energy minimization principle, consider the effect of small changes δN_i in the amounts of the chemical species, while the temperature and (total) pressure are held fixed. By the use of Eq. (1.2-3) and the relation $p_i = p N_i / \sum_1 N_i$, the variation in free energy at constant p may be expressed as

$$\delta F_{\text{tot}} = \sum (F_i^{\circ} + RT \ln p_i) \delta N_i + \sum_1 N_i RT \delta (\ln N_i) - \sum_1 N_i RT \delta (\ln \sum_1 N_i). \quad (1.2-5)$$

Since $\delta \ln x = \delta x / x$, the last two terms on the right hand side of Eq. (1.2-5) cancel and the final result becomes

$$\delta F_{\text{tot}} = \sum_1 (F_i^{\circ} + RT \ln p_i) \delta N_i. \quad (1.2-6)$$

In equilibrium the free energy has a minimum, so $\delta F_{\text{tot}} = 0$ and from Eq. (1.2-6)

$$\sum_1 \delta N_i \ln p_i = - \sum_1 \delta N_i (F_i^{\circ} / RT) \quad (1.2-7)$$

for all sets of δN_i which satisfy the mass-balance constraints. One way of satisfying these constraints is to consider possible chemical reactions, such as



A composition variation due only to this reaction has $\delta N_{XY} = -\delta N_X = -\delta N_Y$ with all other δN_i vanishing. Eq. (1.2-7) then gives

$$\ln p_{XY} - \ln p_X - \ln p_Y = - \frac{F_{XY}^{\circ} - F_X^{\circ} - F_Y^{\circ}}{RT} \quad (1.2-9)$$

Taking the exponential of this equation, one obtains

$$\frac{p_{XY}}{p_X p_Y} = \exp \left[- \frac{F_{XY}^{\circ} - F_X^{\circ} - F_Y^{\circ}}{RT} \right]. \quad (1.2-10)$$

The right hand side of Eq. (1.2-10) is independent of the composition and pressure of the mixture (although it does vary with temperature); it is conventionally called the equilibrium constant, K_p , of reaction Eq. (1.2-8). With the help of the ideal-gas relation, $p_i = N_i RT/V = \bar{N}_i RT$, where \bar{N}_i is the concentration (moles per unit volume) of the species i , Eq. (1.2-10) may be transformed to

$$\frac{\bar{N}_{XY}}{\bar{N}_X \bar{N}_Y} = RT \exp \left[- \frac{F_{XY}^{\circ} - F_X^{\circ} - F_Y^{\circ}}{RT} \right]. \quad (1.2-11)$$

(In Eq. (1.2-11) the F_i° are conventionally evaluated at 1 atmosphere pressure; hence, the units of RT must be atm-volume/mole.) The right hand side of Eq. (1.2-11) may be called the concentration equilibrium constant K_n , for reaction Eq. (1.2-8).

If there are I chemical species present in a reacting mixture and J mass-balance conditions to be satisfied (one for each element present, plus one for charge neutrality if ions are present), it turns out that $I - J$ independent equilibrium equations of the form Eq. (1.2-10) or Eq. (1.2-11)

can be found, and thus there are just enough equations to determine the partial pressures or concentrations uniquely. The set of equations used, however, is not unique, since, for example, the sum or difference of two reactions is also a permissible reaction; its equilibrium constant is just the product or quotient of the constants for the two reactions. Any convenient complete set of equations can be used to get the equilibrium composition.

Unless only two or three reactions are involved, a closed-form solution to the equilibrium equations is usually not obtainable, and numerical iteration schemes must be used. An important exception occurs however, when only atoms, atomic ions, and electrons are involved. The equilibrium ionization equations for each element X can be written

$$N_{X^+} = K_{X^+} N_X / N_e, \quad N_{X^{++}} = K_{X^{++}} N_X / N_e^2, \quad N_{X^{+++}} = K_{X^{+++}} N_X / N_e^3, \quad \dots, \quad (1.2-12)$$

where N_e is the electron concentration.* The sum of these concentrations, plus N_X , is the total concentration of the element X , $N_{\text{tot } X}$, which is usually specified. The summed equations can be readily solved for N_X :

$$N_X = \frac{N_{\text{tot. } X}}{1 + K_{X^+} / N_e + K_{X^{++}} / N_e^2 + \dots} \quad (1.2-13)$$

* If the negative ion X^- is stable, an additional equation for its concentration must be included in Eq. (1.2-12), and corresponding additional terms added to subsequent equations, but this does not complicate the analysis significantly.

If the elements X , Y , ... are present, the charge-balance relation is

$$N_e = N_{X^+} + 2N_{X^{++}} + 3N_{X^{+++}} + \dots + N_{Y^+} + 2N_{Y^{++}} + 3N_{Y^{+++}} + \dots \quad (1.2-14)$$

With the help of Eqs. (1.2-12), (1.2-13), and similar relations for Y , etc., Eq. (1.2-14) can be written

$$N_e = \frac{N_{\text{tot.}X}(K_{X^+}N_e + 2K_{X^{++}}N_e^2 + \dots)}{1 + K_{X^+}N_e + K_{X^{++}}N_e^2 + \dots} + \frac{N_{\text{tot.}Y}(K_{Y^+}N_e + 2K_{Y^{++}}N_e^2 + \dots)}{1 + K_{Y^+}N_e + K_{Y^{++}}N_e^2 + \dots} + \dots \quad (1.2-15)$$

In a specified-density problem the total concentration of each element is known, and Eq. (1.2-15) can in principle be solved for N_e , although analytic solutions are possible only when the number of different ions present is small. However, if the elemental composition (hence, the ratios $N_{\text{tot.}Y}/N_{\text{tot.}X}$, etc.) and the electron concentration N_e are taken as independent variables, Eq. (1.2-15) can be solved directly for $N_{\text{tot.}X}$, and then the other concentrations can be obtained from Eq. (1.2-12), etc., all without iteration.*

Although a solution of Eq. (1.2-15) at a specified density (i.e., specified values of $N_{\text{tot.}X}$, $N_{\text{tot.}Y}$, etc.) usually requires an iteration process, it is a particularly simple one, involving only the variable N_e . A numerical study by the writer shows that a scheme using the total atom concentration as the first approximation to N_e , and obtaining successively better values

* This fact has been discovered, apparently independently, by a number of different workers. The earliest publication known to the writer is that of Hilsenrath, Green, and Beckett (1959).

by substituting the previous value in the right hand side of Eq. (1.2-15), converges quite rapidly when the second approximate N_{\bullet} is larger than about half the atom concentration. For smaller N_{\bullet} values, rapid convergence can be obtained by using for each new approximation the geometric mean between the previous approximation and the value obtained from Eq. (1.2-15).

Once the equilibrium composition of a reacting gas mixture such as high-temperature air is obtained by the free-energy-minimization or equilibrium-constant methods described above, the basic thermodynamic properties may be obtained simply by adding the ideal-gas contributions from the various constituents. The ideal-gas entropies and free energies are conventionally tabulated for 1 atmosphere pressure, and must be corrected to the actual partial pressure of each species, as earlier indicated for the free energy (see Eq. (1.2-3)).

Calculations for "differential" thermodynamic functions, such as the specific heat, are less straightforward. A specific heat computed by averaging the specific heats of the component species, weighted according to their equilibrium concentrations at a given temperature and density, is a "frozen composition" specific heat, useful only in situations where the temperature is varied so rapidly that chemical reactions do not have time to take place. In the usual true-equilibrium situation, however, the variation of composition with temperature gives an additional contribution to the specific heat. Hochstim (1962) has presented rather lengthy equations for the specific heat and related quantities in terms of the equilibrium constants and their temperature derivatives, and shown how

they can be solved for air using a high-speed computer. In most cases, however, it is probably simpler to calculate the energy at two or three closely-spaced points and obtain the specific heat by numerical differentiation. Moreover, in many fireball calculations the energy and pressure of air are approximated by analytic functions of temperature and density. Differentiation of these functions gives approximate values for the specific heat, velocity of sound, etc., rather simply.

The equilibrium compositions obtained in the course of calculating thermodynamic properties are also useful in determining radiation properties (see Volume 2) and transport properties (viscosity, electrical conductivity, etc.) of air. For these purposes it is often more convenient to express species concentrations in terms of molecules (atoms, ions) per unit volume. Since thermochemical tables are usually based on the gram mole, the equations in this chapter are given in molal form, but they are equally valid if concentrations are expressed in molecules (or particles) per unit volume, while volumes, energies, etc., are taken per molecule instead of per mole and the gas constant per mole, R , is replaced by the gas constant per molecule, k (Boltzmann's constant).

1.3 Ideal-gas properties for monatomic gases

As will be shown below, the thermodynamic properties of monatomic gases depend in part on the quantum-mechanical properties of their constituent atoms. It is beyond the scope of this chapter to explain the quantum mechanics of atomic structure (for a good introduction, see

Herzberg, 1944). However, in the next few paragraphs, enough of the terminology will be explained to permit the reader to use existing energy-level tables to calculate thermodynamic properties.

An atom or atomic ion may exist in many different states with different energies, corresponding to different arrangements of the orbital electrons. According to quantum-mechanical principles for light atoms (Russell-Saunders coupling, Herzberg, 1944), the states are grouped in terms, where for each term the total orbital angular momentum (in atomic units) of the electrons must be an integer. The terms are designated, for historical reasons, by the letters S, P, D, F, G, H, ..., corresponding to total orbital angular momenta, L, equal to 0, 1, 2, 3, 4, 5, ..., respectively. In addition, each electron possesses a spin (intrinsic angular momentum) of $1/2$, and these spins add algebraically to give a total spin S. The quantity $2S + 1$ is called the multiplicity of the term; it is conventionally written as a superscript. Thus a term with $L = 2$ and $S = 3/2$ is denoted by 4D . A given atom or ion may have many terms of the same type, with the same L and S values, but differing in the arrangement of the individual electrons, and thus in the energy.

A term having $S \leq L$ is composed of $2S + 1$ levels, having total angular momenta $J = L + S, L + S - 1, L + S - 2, \dots, L - S$, respectively, all with energies fairly close to each other. (If $L \leq S$, the quantities L and S should be interchanged in the preceding statement). Thus, a 4D state is composed of four levels designated by subscripting their J values: $^4D_{7/2}, ^4D_{5/2}, ^4D_{3/2}, ^4D_{1/2}$. By placing the atom in a magnetic field, each of these levels can be split further, into $2J + 1$ individual

sublevels. Quantum theory shows that there are just this many distinct "quantum states" in such an electronic level; in the absence of a magnetic or electric field their energies are the same, so that they can be treated as a single level with a "degeneracy" or statistical weight of $2J + 1$. Often, the splitting of an L, S state into levels with different J values can also be ignored, and it can be treated as a single level with a statistical weight of $(2L + 1)(2S + 1)$. Thus, a 4D state has a statistical weight of 20; its four levels (${}^4D_{7/2}$, ${}^4D_{5/2}$, ${}^4D_{3/2}$, ${}^4D_{1/2}$) have statistical weights of 8, 6, 4, and 2, respectively.

Except for one-electron atoms and ions, accurate calculations of energy levels are difficult, while very accurate measurements by spectrography are usually relatively simple. Since spectroscopists measure wavelengths, which by Planck's law are inversely proportional to the energy level differences, they conventionally present energy levels in units of cm^{-1} . To convert to true energy units, these must be multiplied by hc , where h is Planck's constant and c is the velocity of light.

Moore (1949) has collected together the best experimental energy-level values for the light elements and ions; her tables are complete enough for many practical purposes. If necessary, Moore's values can be tested for completeness by comparison with the tables of predicted terms given in the front of the same volume, and missing values estimated by using various semiempirical methods (isoelectronic extrapolation, quantum defects, screening constants (Herzberg, 1944; Edlen, 1964)). For the highly ionized species, for which experimental data are incomplete, Edlen (1964) gives a number of useful extrapolation formulas and tables.

Fig. 1.1 depicts, as an example, the energy levels of the nitrogen atom. Since, there are many terms with the same L and S values, the terms are also marked with the quantum numbers of the individual electrons. Thus, $2s2p^4$ indicates one electron with principal quantum number $n = 2$ and orbital angular momentum $l = 0$, and four electrons with $n = 2$ and $l = 1$. Although not marked, all of the states shown have two inner, tightly bound electrons, $1s^2$; states without these electrons lie so high in energy that they can be completely ignored for present purposes.

According to statistical mechanics (Mayer and Mayer, 1940), in an ideal gas in equilibrium, the fraction of an atomic or ionic species which is in a particular electronic state or level j is

$$N_j/N = (g_j/Q) \exp (-hcE'_j/kT) , \quad (1.3-1)$$

where g_j is the statistical weight of the level, E'_j is its energy (in cm^{-1}), and Q is a proportionality constant called the partition function. The fraction N_j/N is also called the "fractional population" or "occupation number." When Eq. (1.3-1) is summed over all j values, the left-hand side reduces to unity and the equation can be solved for the partition function:

$$Q = \sum_j g_j \exp (-c_2 E'_j/T) , \quad (1.3-2)$$

where c_2 is known as the second radiation constant,

$$c_2 = hc/k = 1.43879 \text{ cm}^\circ\text{K} \quad (1.3-3)$$

The values quoted in this chapter for the pertinent physical constants are those recently recommended by the National Academy of Sciences - National Research Council (1964); they differ slightly from those used in previous work.

The electronic-energy contribution of the atoms in state j to the internal energy of the gas is $N_j G hcE'_j$, where G is the number of atoms per mole (Avogadro's number). Since $G = R/k$, this contribution can also be written $N_j Rc_2 E'_j$. The ideal-gas internal energy per mole can then be obtained by using Eq. (1.3-1) to evaluate N_j , summing the contributions over j , and adding $(3/2)RT$ for the contribution from the translational motion of the atoms. The result may be written in dimensionless form:

$$\frac{E^o - E_0^o}{RT} = \frac{3}{2} + \frac{1}{QT} \sum_j c_2 E'_j \exp(-c_2 E'_j / T), \quad (1.3-4)$$

where the superscript o indicates the ideal-gas state, the subscript 0 indicates 0°K , and

$$R = 8.3143 \times 10^7 \text{ erg}/^\circ\text{K-mole} = 1.98717 \text{ cal}/^\circ\text{K-mole}. \quad (1.3-5)$$

E_0^0 in Eq. (1.3-4) represents the internal energy of the ideal gas at 0°K ; its numerical value is somewhat arbitrary, since in thermodynamics only energy differences can be measured. However, in reacting gases, consistent choices must be made, so that the differences in E_0^0 values between the reactants and the products gives the correct reaction energy (at absolute zero). For example, if E_0^0 is taken to be zero for atomic N, the corresponding quantity for N^+ must equal the ionization energy of N, while that for N_2 must be the negative of the dissociation energy. In thermochemistry it is conventional to choose $E_0^0 = 0$ for the elements in the phases that are stable at room temperature and pressure. For air (including carbon dioxide) these are gaseous N_2 , O_2 , and Ar and crystalline graphite. The use of graphite as a reference material has the disadvantage that it makes the internal energy of gaseous CO_2 negative, and this causes the calculated energies for air near room temperature to deviate appreciably from direct proportionality to the temperature. To prevent this behavior, E_0^0 for gaseous CO_2 (as well as gaseous N_2 , O_2 , and Ar) has been set equal to zero in the present work.

The corresponding values of E_0^0 for the atomic species of present interest are given in the first table of the second chapter, together with the dissociation and ionization energies from which they were derived, and the corresponding references. An effort was made to obtain the best values presently available, since results of thermodynamic calculations are usually more sensitive to inaccuracies in these values than to any other inaccuracies.

The ideal-gas entropy (at one atmosphere pressure) can be obtained, except for a constant term, from the thermodynamic relation $S = \int dH/T$ (p constant), where $H = E + RT$ and E is given by Eq. (1.3-4). The result can be written

$$S^{\circ}/R = (E^{\circ} - E_0^{\circ})/RT + \ln Q + \frac{5}{2} \ln T + C, \quad (1.3-6)$$

where statistical mechanics (Mayer and Mayer, 1940) shows that the integration constant is

$$C = 1 + \ln(k/p^{\circ}) + \frac{3}{2} \ln(2\pi M k/\mathcal{C}h^2) = \frac{3}{2} \ln M - 2.66496, \quad (1.3-7)$$

with $p^{\circ} = 1$ atmosphere and M the atomic weight. Other ideal-gas thermodynamic properties can be obtained from Eq. (1.3-4) and Eq. (1.3-6) using well-known thermodynamic identities. For example, the dimensionless Gibbs free energy is given by

$$-\frac{F^{\circ} - E_0^{\circ}}{RT} = \frac{S^{\circ}}{R} - \frac{E^{\circ} - E_0^{\circ}}{RT} - 1 = \ln Q + \frac{5}{2} \ln T + \frac{3}{2} \ln M - 3.66496. \quad (1.3-8)$$

Substitution of this expression in Eq. (1.2-11) gives an equation for the equilibrium constant in terms of the partition functions of the reactants:

$$\frac{N_{AB}}{N_A N_B} = Q \left(\frac{Q_{AB}^2 M_{AB}}{2\pi k T M_A M_B} \right)^{3/2} \frac{Q_{AB}}{Q_A Q_B} \exp \left[- \frac{E_0^{\circ}(AB) - E_0^{\circ}(A) - E_0^{\circ}(B)}{RT} \right]. \quad (1.3-9)$$

When A represents a positive ion, B an electron (with $Q_B = 2$), and AB a neutral atom, Eq. (1.3-9) yields the familiar Saha equation for equilibrium ionization.

In calculating ideal-gas functions by the above equations, however, there is a basic difficulty not mentioned in elementary texts. An isolated atom or positive ion (in an unlimited volume) actually has an infinite number of stable electronic states with energies E_j less than its ionization energy, and thus the sums in Eq. (1.3-2) and Eq. (1.3-4) diverge. However, at temperatures up to several thousand degrees the series are semi-convergent in the sense that essentially the same answer is obtained by taking the first ten or the first ten thousand terms. The omission of the infinite "tail" of the series, which contains terms corresponding to electrons in highly-excited levels, is justified because in actual situations no atom can occupy an unlimited volume, since it is limited at least to the volume of the system, and generally, in systems containing many atoms, to a much smaller volume, comparable to the mean volume per atom (see Section 1.7).

At somewhat higher temperatures the difficulty is less trivial, because there may be no point at which the terms in the sum become small, and thus the answer may depend significantly upon where the series is broken off. This is illustrated in Fig. 1.2, which shows the percentage increase in internal energy and free energy as the cutoff point is raised from an electron quantum number of $n = 4$ to $n = 8$. Various workers have suggested simple cutoffs which depend upon the atom density, the electron density, or the temperature. However, none of these simple

one-parameter relations can be completely correct, because the high electronic levels are affected both by close-in neutral particles and, to a greater extent, by close-in charged particles, while the temperature influences how often these particles come close-in. The true cutoff is thus a function of the composition, density, and temperature, so that if the sums in Eqs. (1.3-2) and (1.3-4) are sensitive to the cutoff the "ideal-gas" functions also depend upon the composition and density as well as temperature, which greatly complicates thermodynamic calculations. Moreover, the higher bound levels below the cutoff may be perturbed sufficiently to further affect the thermodynamic properties.

As shown by Fig. 1.2, at successively higher stages of ionization an atom's properties remain independent of the cutoff to successively higher temperatures. In air below standard (sea level) density, as the temperature is raised to the point where the cutoff for any particular ion becomes important the concentration of that ion becomes so small (due to further ionization) that the choice of cutoff has little effect on the thermodynamic properties of the equilibrium mixture. Unfortunately, this simplification does not hold for the highest air densities of present interest (up to 10 times the standard density, as produced by a strong shock wave at low altitudes). Even at such densities, however, electronic states with $n \leq 4$ should be little affected by neighboring atoms, since the electronic orbits of such states lie well within the mean interatomic or interionic distance. Thus, thermodynamic functions calculated by summing up to $n = 4$ represent lower limits to the true values. In addition, they usually represent useful approximations to the actual

values, since at high densities the correct cutoff is not much greater than 4 (see Section 1.7), while at low densities the equilibrium properties are relatively insensitive to the cutoff, as already pointed out.

If better, variable-cutoff thermodynamic properties are required they may be obtained by adding the contributions from states between $n = 5$ and the cutoff n_c . For light atoms and ions, the most important of such states are those having only one electron with $n > 4$, such states with one electron outside a "core" are quite hydrogen-like, with a statistical weight equal to $2n^2$ times that of the core (with the outer electron removed), and an energy just $Ry (Z + 1)^2/n^2$ less than the energy of the core, where Ry is the Rydberg ($109,737 \text{ cm}^{-1} = 13.605 \text{ eV}$), and Z is the charge of the atom or ion. The partition-function summation, Eq. (1.3-2), over these states can then be factored into a sum over the states of the outer electron and a sum over the states of the core. The final result is

$$Q(X) = Q_{n \leq 4}(X) + Q_{n \leq 4}(X^+) \exp \left(-\frac{I(X)}{kT} \right) \sum_{n=5}^{n_c} 2n^2 \exp \left(\frac{Ry (Z+1)^2}{n^2 kT} \right) \quad (1.3-10)$$

where $Q_{n \leq 4}(X^+)$ is the partition function for the next higher ion and $I(X)$ is the $X \rightarrow X^+$ ionization energy. Since the cutoff n_c depends upon temperature, density, and somewhat on composition (see Section 1.7), it is more convenient to calculate the correction term on the right hand side of Eq. (1.3-10) during the course of an equilibrium ionization calculation than to tabulate the "true" ideal-gas thermodynamic properties of each species as functions of two or three variables.

Accordingly, ideal gas functions for the atoms and ions of C, N, O, and Ar have been calculated for temperatures of present interest using a fixed cutoff just above $n = 4$. Extensive numerical results are presented in Chapter 2. Tables showing the energy-level data used, and the fractional population of each electronic state versus temperature are also included. The thermodynamic results have been compared with results of several previous workers (JANAF Thermochemical Tables, 1960; Gilmore, 1955; Woolley, 1957; Kilsch, Gilmer, and Gilles, 1957; Green, Poland, and Margrave, 1960; Yungman et al., 1961; Martinez, 1961; Gurvich et al., 1962; McBride et al., 1963; Hilsenrath, Messina, and Evans, 1964). Up to 10,000°K, almost all the results agree to within 0.03 per cent. Moreover, the small differences are due primarily to use of different values for the gas constant R ; if this is corrected for, the deviations are generally reduced to less than 0.01 per cent. An exception is the table for N by Hilsenrath, Messina, and Evans (1964), which gives values deviating from other work by up to 2 per cent (their values for the other air atoms and ions show no such deviation).

Only a few tables extending above 10,000°K have been published previously, and these show increasing variations in the results for the neutral atoms, depending upon the electronic cutoff used by the different investigators. (Variations for the ions appear only at considerably higher temperatures, as shown by Fig. 1.2.) The earlier work by the writer (Gilmore, 1955) up to 24,000°K used a cutoff around $n = 5$ but omitted some states. Up to 12,000°K those results agree very well with the present results, but differ by up to 6 per cent for the neutral atoms at 24,000°K. The values of Woolley (1957) to 4,000,000°K and the extensive Russian tables (Yungman et al., 1961; Gurvich et al., 1962) to 20,000°K also show deviations above 10,000°K. Woolley (1957) used a somewhat different type of cutoff that excludes many

states included in the present work (planning to include them in subsequent equilibrium calculations). Hence, his values for the enthalpy, entropy, and negative free energy are generally lower than the present values; for the neutral atoms the difference is a few per cent or less at $20,000^{\circ}\text{K}$. On the other hand, the Russian values are generally higher because they used cutoffs at $n = 11 - 13$, based on restricting the electrons to the mean volume per atom at densities corresponding to a pressure of one atmosphere. At $20,000^{\circ}\text{K}$ their enthalpy values for the neutral atoms are almost a factor of two higher than the present values, although their entropies and free energies are only a few per cent higher. Whether such differences are significant in equilibrium thermodynamic calculations depends upon the density under consideration and also upon whether separate allowance for the highly excited states is made in the equilibrium computation, as already discussed (see also Section 1.7).

1.4 Ideal-gas properties for diatomic gases

The relations Eqs. (1.3-4) and (1.3-6) for the energy and entropy of a monatomic gas apply equally well to a molecular gas, provided that the summations are extended over all the molecular energy levels, which can differ not only in electronic energy but also in rotational and vibrational energy. Because of these additional degrees of freedom, the individual levels of a molecule are so numerous that it is rather impractical to tabulate all of them. Fortunately, however, for each degree of electronic excitation the rotational and vibrational levels are usually quite regular and can be represented by simple formulas, only the coefficients of which

need to be tabulated. Moreover, using these formulas, the terms of the series in Eqs. (1.3-2), (1.3-4) and (1.3-6) can often be summed algebraically with reasonable accuracy, at least in some temperature ranges.

The energy levels of molecules can be grouped into electronic states, each of which is characterized (in part) by the total spin S of the electrons. Just as for atoms, the multiplicity $2S + 1$, is written as a superscript on the left of the state symbol. Unlike the atoms, however, diatomic molecules have an internuclear axis, and the second important quantum number is not the total orbital angular momentum, L , of the electrons, but the component, Λ , of this momentum in the axial direction. In analogy with the Roman-letter designations of atomic terms, diatomic states are designated by the Greek letters Σ , Π , Δ , Φ , ..., corresponding to $\Lambda = 0, 1, 2, 3, \dots$. Because in diatomic molecules terms of a given L are separated into states of different Λ , the statistical weights of these states are generally less than those of the corresponding atomic terms; specifically, the weights are $2S + 1$ for Σ states and $2(2S + 1)$ for Π , Δ , Φ , ..., states. States with $S > 0$ and $\Lambda > 0$ split into $2S + 1$ substates, designated by writing the vector sum of Λ and the axial component of S as a subscript. However, this splitting can often be ignored, since it is usually small and often associated only with higher excited states. Other subscripts and superscripts are sometimes added to the state symbol to indicate the electronic symmetry, but this does not affect the present considerations.

Since a diatomic molecule may have more than one state with the same S and Λ values, and also since there may be a considerable period between the experimental discovery of a state and the determination of its type, the states are also labelled somewhat arbitrarily by Roman letters, with X designating the ground state, and A, B, C, \dots the successively higher (or earlier discovered) states of the same multiplicity as the ground state, while a, b, c, \dots designate states of a different multiplicity. (Exceptions are the N_2 and C_2 molecules, where the capital and lower case letters are reversed, due to early misidentification of the ground state.)

The electronic energy of a diatomic molecule depends not only upon the electronic state but also upon the interatomic (or, more accurately, internuclear) distances. Curves showing this variation for N_2 and N_2^+ are presented in Fig. 1.3. At large internuclear distances the energy must be that of two individual atoms. At distances approaching zero the energy must approach infinity because of the strong Coulomb (electrostatic) repulsion between the two nuclei. At intermediate distances the curve must have a minimum if the molecular state is to be stable. The two nuclei will tend to approach this minimum-energy distance, but may vibrate about this point. Since the vibrational motion of the nuclei is much slower than the orbital motions of the lighter electrons, the electrons will keep adjusted to the instantaneous position of the nuclei. Thus, the electronic energy will follow the same curve regardless of the amplitude of vibration, and such a curve forms an effective potential for molecular vibration.

The lower portion of an attractive potential curve (see Fig. 1.3) can often be approximated by a parabola. Quantum theory (Herzberg, 1950) shows that the vibrational energy in a parabolic potential equals $w(v + 1/2)$, where w is a constant which depends inversely upon the width of the parabola, v is the vibrational quantum number, which can take on the values 0, 1, 2, ..., and the zero of energy is measured from the bottom of the parabola. Actual potential curves, however, diverge more and more from a parabola at higher energies; therefore the vibrational energy levels, instead of being evenly spaced as in the above formula, fall closer and closer together as the dissociation limit is approached. It is conventional to fit these levels by the formula

$$G(v) = w_e(v + 1/2) - w_e x_e(v + 1/2)^2 + w_e y_e(v + 1/2)^2 + \dots, \quad (1.4-1)$$

where w_e , $w_e x_e$, $w_e y_e$, etc., are constants determined spectroscopically, and the subscripted e indicates that this is an expansion about the equilibrium point (potential curve minimum). The short numbered lines on the potential curves of Fig. 1.3 indicate the observed vibrational energy levels of these molecules.

Besides vibrating, a molecule can also rotate. The simplest approximation is that of a "rigid rotator," whose quantum-mechanical energy levels (Herzberg, 1950) are given by $BJ(J+1)$, where B is a constant inversely proportional to the square of the internuclear distance, and the rotational quantum number J equals 0, 1, 2, ... Since actual molecules are not rigid, but stretch as they rotate so that the effective value of B

decreases with increasing J , a negative correction term proportional to $J^2(J+1)^2$ is conventionally added to the energy expression. Moreover, if the molecule is also vibrating, this affects the mean internuclear distance and gives a B value which depends somewhat on the vibrational quantum number.

By adding the contributions of electronic, vibrational, and rotational energy one obtains the following general formula for the molecular energy levels (term values):

$$\begin{aligned} \tilde{G}(v, J) = & \tilde{G}_e^* + \omega_e(v+1/2) - \omega_e x_e(v+1/2)^2 + \omega_e y_e(v+1/2)^3 \\ & + \dots + B_v J(J+1) - D_v J^2(J+1)^2 + H_v J^3(J+1)^3 + \dots, \end{aligned} \quad (1.4-2)$$

where

$$B_v = B_e - \alpha_e(v+1/2) + \gamma_e(v+1/2)^2 + \dots,$$

$$D_v = D_e + \beta_e(v+1/2) + \dots,$$

$$H_v = H_e + \delta_e(v+1/2) + \dots,$$

and \tilde{G}_e^* is the electronic energy at the equilibrium distance, taking the zero of energy to be the lowest level ($v = 0, J = 0$) of the ground state. (The asterisk is added to distinguish this quantity from the conventional \tilde{G}_e , the energy above the potential minimum of the ground state.) In Eq. (1.4-2) some generally-negligible terms due to the interaction of the electronic and

rotational angular momenta have been omitted.

The statistical weight of each level is just the electronic statistical weight already discussed, multiplied by $2J + 1$ for most molecules. However, if the molecule is homonuclear (like N_2 , N_2^+ , etc.) the $2J + 1$ is replaced by a rapidly-oscillating function of J , which for present purposes can be approximated by its mean value, $(2J + 1)/2$.

Since each electronic state has only a finite number of bound rotational-vibrational levels,* the summations required for thermodynamic calculations can be carried out without any further convergence difficulties. However, at temperatures of a few thousand degrees, many hundreds of terms make significant contributions to the sums, so that hand computations become lengthy. For this reason, Mayer and Mayer (1940) have worked out approximate algebraic formulas for these sums, based on replacing the summation over rotational levels by an integration, and neglecting or approximating the higher correction terms in the energy-level formulas. However, some of these approximations become poor at very high temperatures. Moreover, with modern high-speed computers it is virtually as easy to perform the summation directly.

At temperatures above $5000^\circ K$ or $6000^\circ K$, vibration-rotation energy levels of the lower electronic states near their dissociation limits can make significant contributions to the thermodynamic properties. Unfortunately, spectroscopic measurements on such levels have not been made for most electronic states of interest. For the few states for which they are available, it is found that a large number of terms must be included in Eq. (1.4-2) in order to fit the data. This indicates that the usual measurements on only the lower levels of an electronic state cannot be safely

* Neglecting a few highly-excited states which dissociate to positive plus negative atomic ions.

extrapolated to get the very high levels. However, these levels are determined by the high portions of the corresponding potential curve. It is often possible to determine this curve with some confidence, by use of Rydberg-Klein and valence-bond calculations (Vanderslice, Mason, and Lippincott, 1959; Gilmore, 1965). The energy levels corresponding to this curve can then be calculated quantum-mechanically.

For present purposes, however, it is possible to bypass this last step, and calculate the contributions of the high levels to the thermodynamic properties directly from the potential curve. At temperatures where these levels contribute significantly, their spacing is small compared to kT , so that the formulas of classical statistical mechanics can be used. These formulas show that the partition function for structureless particles of mass m with total energies between E_1 and E_2 , in a volume dV where the potential is U , is given by (Mayer and Mayer, 1940):

$$\frac{2\pi(2m)^{3/2}dV}{h^3} \int_{E_1}^{E_2} (E-U)^{1/2} \exp(-E/kT) dE \quad (1.4-3)$$

$$= \frac{2\pi(2mkT)^{3/2}dV}{h^3} e^{-U/kT} \left[\frac{\sqrt{\pi}}{2} \operatorname{erf} x^{1/2} - x^{1/2} e^{-x} \right]_{(E_1-U)/kT}^{(E_2-U)/kT},$$

where erf is the error function. The partition function contribution from diatomic energy levels between E_1 and the dissociation energy D can be obtained by multiplying the above expression by the electronic statistical weight g_e , letting m be the reduced mass, $M_1 M_2 / (M_1 + M_2) Q$,

where M_1 and M_2 are the atomic weights of the two atoms, replacing dV by $4\pi r^2 dr$ where r is the internuclear distance, and integrating over r . The result is

$$Q(E_1 \text{ to } D) = \frac{8\pi^2 (2mkT)^{3/2} g}{h^3} \left[\int_{r_0}^{\infty} f_D(r) r^2 dr - \int_{r_1}^{r_2} f_1(r) r^2 dr \right] , \quad (1.4-4)$$

where

$$f_D(r) = \frac{\sqrt{\pi}}{2} \operatorname{erf} \left(\frac{D - U(r)}{kT} \right)^{1/2} e^{-U(r)/kT} - \left(\frac{D - U(r)}{kT} \right)^{1/2} e^{-D/kT} ,$$

$f_1(r)$ is the same function except that D is replaced by E_1 , r_0 is the point on the inner branch of the potential curve where $U(r) = D$, and r_1 and r_2 are the two points where $U(r) = E_1$. A similar but slightly longer expression can be derived for the summation appearing in Eq. (1.3-4).

The above approach omits the quasistable rotational levels above the dissociation energy (Herzberg, 1950), which some investigators include. However, such levels are more conveniently treated as two separate atoms subject to an interatomic attraction (see Section 1.6). Moreover, there is little point in including bound levels near or above the dissociation energy unless the unbound or "repulsive" states or levels of similar energy and internuclear distance are also included, since the two types make comparable contributions to the equilibrium thermodynamic properties. Inclusion of the latter type, however, requires a departure from the ideal-gas approximation.

To check the accuracy of the above relations, partition function and energy calculations for several of the states of N_2 , NO , and O_2 were made using the direct summation method up to $1/3$, $1/2$, and $2/3$ of the dissociation energy, respectively, and the classical integrals beyond these energies. The results using the three different crossover points were virtually identical up to several thousand degrees, and agreed within 0.5 per cent for the entire range from 1000 to 40,000°K.

The total partition function and energy of diatomic molecules may be obtained by adding such contributions from all the electronic states. Of course, just as for atoms, isolated molecules have an infinite number of high-excited electronic states, while at finite densities these are "cut off" in some complicated fashion by electron-ion interactions. However, for most molecules such states lie considerably above the dissociation energy, so the molecules tend to dissociate before the choice of electronic cutoff makes much difference. In fact, unless the repulsive as well as attractive states near the dissociation energy are treated carefully, there is little point in including states above the dissociation energy (unless their fractional populations are desired for other purposes, such as radiation calculations).

In the present work, thermodynamic calculations were made for the diatomic molecules N_2 , N_2^+ , NO , NO^+ , O_2^- , O_2 , O_2^+ , and CO , which make a significant contribution either to the thermodynamic properties or to the charged-particle concentration of equilibrium air. These calculations included all the known and predicted bound states up to the

lowest dissociation limit, and in some cases one or two states above this limit. The method used was to sum over the energy level up to half the dissociation energy of each state, where the levels were calculated using the spectroscopic data given in Table 86 of the supplementary volume. (The higher rotational constants D_v and H_v , for which data are sparse, were calculated from the vibrational constants using formulas given in Herzberg (1950).) Levels above half the dissociation energy were included by means of the classical integral, Eq. (1.4-3), using the potential curves of Figs. 1-3 to 1-5, and of Krupenie and Weissman (1965) for CO.

The results are presented in Chapter 2. Up to 6000°K they generally agree very well with those of previous workers (Gillmore, 1955; Beckett and Haar (1957); JANAF Thermochemical Panel (1960); Yungman et al., 1961; Gurvich et al., 1962; Bristow and McChesney, 1965) except for small differences due to use of more recent values for the gas constant R and the second-radiation constant $c_2 = hc/k$. Above 6000°K, however, the present values for most molecules begin to diverge from the older values, usually in the positive direction due to inclusion of more electronic states in the present calculation than in any previous calculation, except that of Bristow and McChesney (1965). At still higher temperatures, around 15,000 or 20,000°K, the present values cross over and fall below the few previous values available, because previous investigators effectively included some levels above the dissociation limit of each state.

1.5 Ideal-gas properties for polyatomic gases

The only polyatomic molecules which contribute as much as 0.01 per cent to the equilibrium thermodynamic properties of dry air are CO_2 and NO_2 . In addition, the negative ion NO_2^- can affect the electron concentration and hence the radio-wave absorption of high density air at a few thousand degrees, so it is desirable to include it in the equilibrium calculation.

The ideal-gas properties of polyatomic molecules can be computed by summing over their rotational, vibrational, and electronic energy levels in the same way as already described for diatomic molecules. Of course, the additional rotational and vibrational degree of freedom of the larger molecules produce a more complex set of energy levels. However, since the concentrations of polyatomic molecules generally become small above 5000 or 6000°K, the calculations can be restricted to lower temperatures, where excited electronic states and high rotational and vibrational levels can usually be neglected. This permits relatively simple approximations to the ideal-gas thermodynamic properties (Mayer and Mayer, 1940).

Results of such calculations are available in the JANAF Tables (1960) for the polyatomic molecules of present interest except NO_2^- . Thermodynamic values for the latter are tabulated in a recent report by Clifton (1966).

Since the existing ideal-gas tables for polyatomic molecules are fairly adequate for high-temperature air calculations, no further equations or tables will be presented here.

1.6 Effects of interparticle forces on the thermodynamic properties of air

In the ideal-gas approximation the interactions between the molecules, atoms, ions, and electrons in high-temperature air are neglected, except when two or more particles are bound together and can be treated as a single particle. This approximation is reasonable at low air densities, but at sufficiently high densities the mean distance between free particles becomes so small that such interactions can no longer be neglected. For neutral molecules and atoms, interaction forces are very small except at distances less than about twice the intermolecular distance in the liquid or solid phase. The highest air density associated with nuclear fireballs or missile flow-fields is that produced by a strong shock wave at sea level, which is roughly 0.01 g/cm^3 (about 10 times the ambient density). Since this density is about 1 per cent of that of liquid air, one may expect that neglect of intermolecular forces will produce errors of the order of one per cent in the thermodynamic properties.

At temperatures so high that the air is largely ionized, considerably greater errors can be made by neglecting the interactions between the ions and electrons. This large effect is due to the long range of the Coulomb forces between charged particles, which decrease with distance like $1/r^2$, in contrast to the forces between neutral molecules, which decrease like $1/r^7$ for large values of r . As an example, consider

air at 0.01 g/cm^3 and $70,000^\circ\text{K}$, where the major equilibrium species are N^+ , O^+ , and free electrons. The ideal-gas pressure under these conditions is about 10,000 atm, while the total Coulomb force between neighboring electrons and positive ions (at their mean distance on opposite sides of a unit surface) is about 1000 atm. Accordingly, one may expect errors of the order of ten per cent in the ideal-gas approximation under these conditions. This makes it quite desirable to include corrections for charged-particle interactions in the thermodynamic calculations for air, as well as somewhat desirable to include neutral-particle interactions.

The standard method for the thermodynamic treatment of moderately dense gases is to write a virial expansion, where the first term is the ideal-gas contribution and subsequent terms give the contributions from two-particle, three-particle, etc., interactions. The virial equation for the pressure of a gas mixture may be written (Mayer and Mayer, 1940; Hirschfelder, Curtis, and Bird, 1954)

$$p = \sum_i \bar{N}_i RT + \sum_i \sum_j \bar{N}_i \bar{N}_j B_{ij}(T) RT + \sum_i \sum_j \sum_k \bar{N}_i \bar{N}_j \bar{N}_k C_{ijk}(T) RT + \dots, \quad (1.6-1)$$

where $B_{ij}(T)$, $C_{ijk}(T)$, ... are called the second, third, etc., virial coefficients. These coefficients can be evaluated in terms of the inter-particle forces. If we treat the air particles as spherical so that they have a two-particle interaction energy U_{ij} which depends only on their distance r , the second virial coefficient is given by (Mayer and

Mayer, 1940; Hirschfelder, Curtis, and Bird, 1954)

$$B_{ij}(T) = 2\pi Q \int_0^{\infty} [1 - \exp(-U_{ij}(r)/kT)] r^2 dr \quad , \quad (1.6-2)$$

where Q is Avogadro's number. The expressions for the higher virial coefficients are much more complicated, but fortunately the corresponding terms in the virial expansion can generally be neglected for air densities of present interest.

A virial expansion can also be written for the internal energy, similar to Eq. (2.6-1) for the pressure, except that temperature derivatives of the virial coefficients, $T dB_{ij}/dT$, etc., appear instead of the coefficients themselves. Tabulations of virial coefficients for various molecules (Hirschfelder, Curtis, and Bird, 1954; Woolley, 1962) show that, at the high temperatures of present interest, such derivatives are typically an order of magnitude smaller than the coefficients themselves. This is to be expected, since the longer-range intermolecular interactions (except for Coulomb interactions) are fairly small compared to thermal energies at such temperatures, so that molecules behave roughly like rigid spheres, with virial coefficients approximately independent of temperature. Accordingly, for air densities and temperatures of present interest, it is reasonable to neglect virial corrections to the internal energy (except for charged-particle interactions; see Section 1.7).

The Helmholtz free energy is given by

$$A = A_{\text{ideal}} + VRT \sum_{\text{mixture}} \sum_j \bar{N}_i \bar{N}_j B_{ij}(T) + \dots \quad , \quad (1.6-3)$$

where V is the volume of the system. The virial corrections to the entropy and the Gibbs free energy may be obtained readily from Eqs. (1.6-1) and (1.6-3) with the help of the thermodynamic identities $S = (E-A)/T$ and $F = A + pV$.

In Section 1.2 the ideal-gas expression for the chemical-equilibrium constant, in terms of partial pressures, was derived by minimizing the Gibbs free energy. For nonideal gas mixtures, however, a similar derivation is not convenient because the total pressure is no longer the sum of the individual partial pressures. The equilibrium constant may be obtained instead, by minimizing the Helmholtz free energy at constant temperature and volume. Equation (1.6-3), after substitution for the ideal free energy from Eq. (1.2-4), can be written

$$A/VRT = \sum_i \bar{N}_i \left[F_i^0/RT - 1 + \ln(\bar{N}_i RT) \right] + \sum_i \sum_j \bar{N}_i \bar{N}_j B_{ij}(T) . \quad (1.6-4)$$

The minimization condition that the differential vanish yields, after some cancellation,

$$0 = \sum_i \left[F_i^0/RT + \ln(\bar{N}_i RT) + 2 \sum_j \bar{N}_j B_{ij} \right] \delta \bar{N}_i . \quad (1.6-5)$$

For variations due to a single chemical reaction, $XY \rightleftharpoons X + Y$, one has $\delta \bar{N}_{XY} = -\delta \bar{N}_X = -\delta \bar{N}_Y$, while all other $\delta \bar{N}_i$ vanish, so that Eq. (1.6-5) yields

$$\frac{\bar{N}_{XY}}{\bar{N}_X \bar{N}_Y} = RT \exp \left[-\frac{F_{XY}^0 - F_X^0 - F_Y^0}{RT} - 2 \sum_j \bar{N}_j (B_{XY,j} - B_{Xj} - B_{Yj}) \right] . \quad (1.6-6)$$

The ideal-gas part of this equation agrees with Eq. (1.2-11).

In order to apply the relations derived above to thermodynamic calculations, numerical values for the second virial coefficients, $B_{ij}(T)$, are needed. For most common molecules that are stable at room temperature, values of the virial coefficients for like molecules ($i = j$) and a few for unlike molecules ($i \neq j$) have been measured over the easily-accessible temperature range, and extrapolated to higher temperatures by fitting an intermolecular potential according to Eq. (1.6-2) (Hirschfelder, Curtis, and Bird, 1954). Woolley (1962) has calculated and tabulated such values for air molecules up to $15,000^{\circ}\text{K}$. However, at high temperatures such extrapolations often give too high values. Better virial coefficients for N_2 and the rare gases have been calculated by Amdur and Mason (1958), using potentials derived from molecular beam scattering. In the calculation range of 1000 to $15,000^{\circ}\text{K}$ their values for N_2 range from 0 to 19 per cent lower than those of Woolley, while their values for Ar are 10 to 23 per cent lower.

In high temperature air calculations, virial coefficients are also needed for species such as atomic N and O, for which no measurements are available. Woolley (1962) has also made estimates of these coefficients by deducing the interatomic potentials from the corresponding intermolecular potentials. For interactions not involving chemical bonding, such as N - N_2 or O - Ar, his results are not unreasonable. However, better values for the N - N_2 virial coefficient may be obtained by using the potential calculated by Meador (1960) using valence-bond theory. The results range from 25 to 40 per cent lower than Woolley's results, over the temperature range from 8000 to $15,000^{\circ}\text{K}$. It may be added that Meador's

potential, and the derived virial coefficient, are probably about 4 per cent too low, judging by a comparison of his $N_2 - N_2$ potential with the experimental results of Amdur, Mason, and Jordan (1957).

Nonbonding potentials, at temperatures of several thousand degrees or more where the small van der Waals attraction is negligible, can usually be fit by an exponential repulsion:

$$U(r) = a e^{-cr} , \quad (1.6-7)$$

where a and c are constants which depend upon the two molecules or atoms. The integral in Eq. (1.6-2) can then be approximated by (Amdur and Mason, 1958)

$$B(T) = \frac{2\pi a_0}{3c^3} \left[\log \frac{1.781a}{kT} \right]^3 , \quad kT \ll a . \quad (1.6-8)$$

The recommended values for the constants, obtained by increasing Meador's (1960) values by 4 per cent, are

$$\begin{aligned} N_2 - N_2: \quad a &= 833 \text{ eV}, \quad c = 2.78 \times 10^8 \text{ cm}^{-1} , \\ N - N_2: \quad a &= 363 \text{ eV}, \quad c = 2.85 \times 10^8 \text{ cm}^{-1} . \end{aligned} \quad (1.6-9)$$

Much less is known about the high-temperature interactions of other air molecules and atoms, although some theoretical calculations involving O_2 , NO , and O are available (Meador, 1960). However, these molecules and atoms, and even many of the minor air species like CO and C , are approximately the same "size" as N_2 or N , and should have roughly the same high-temperature

virial coefficients. For air above 8000°K, it is reasonable, then, to use Eqs. (1.6-8) and (1.6-9a) for all neutral molecule-molecule interactions, and Eqs. (1.6-8) and (1.6-9b) for all neutral atom-molecule interactions.

Virial coefficients for interactions between neutral and charged particles, on the other hand, are generally much smaller (Woolley, 1960) because the polarization attraction counteracts the core repulsion. For present purposes it seems adequate to set them equal to zero. Coulomb interactions between charged particles will be considered later, in Section 1.7.

Interactions involving chemical bonding, such as the important N - N , N - O , and O - O interactions, cannot be adequately treated by considering only a single interaction potential. Instead, as shown in Figs. 1-3, 1-4, and 1-5, the two atoms may approach each other on any of several potential curves, depending on the relative orientation of their electrons. The correct virial coefficient to use is a weighted average of the values computed using the various curves, where the proper weights are the statistical weights of the molecular states (see Section 1.4), and contributions of those states or levels already included in the molecular partition function should be omitted here.

The present calculations of the partition function and thermodynamic properties of diatomic molecules, described in Section 1.4, include for all the lower electronic states every rotational-vibrational level below the corresponding dissociation energy. For attractive potentials, to be consistent, the virial integral of Eq. (1.6-2) must then

be replaced by one which omits contributions from bound states. The result, after taking the weighted average over the different electronic states n , is

$$B(T) = \frac{2\pi q}{\sum_n g_n} \sum_n g_n \int_0^\infty r^2 dr \left[1 - \left(e^{-U_n/kT} \right)_{U_n > 0} - \frac{2}{kT/\pi kT} \int_{U_n < 0}^\infty (E - U_n)^{1/2} e^{-E/kT} dE \right] \quad (1.6-10)$$

where for simplicity the subscripts ij designating the interacting atoms, and the variation of U_n with r , are not explicitly indicated. The last integral in Eq. (1.6-10) can also be expressed in terms of the error function, as in Eq. (1.4-3).

Sample calculations for nitrogen and oxygen atoms at high temperatures were carried out using Eq. (1.6-10). They gave second virial coefficients almost an order of magnitude smaller than those involving molecules, because negative contributions from nonbound levels in the attractive potentials largely cancelled the positive contributions from the repulsive cores. Accordingly, for present purposes the atom-atom virial corrections can be neglected.

It might be mentioned that when high-temperature diatomic partition functions are calculated by integrating over all portions of the potential curves and all energies, as done by Beckett and Haar (1957) and Bristow and McChesney (1965), instead of cutting them off at the dissociation energy as done in Section 1.4, the corresponding atom-atom virial correction is already included implicitly in the molecular thermodynamics. The only remaining contributions to the coefficient are those from any electronic

states not included in the diatomic integration. In principle, the diatomic partition functions could include all electronic states, thus making the atom-atom virial coefficients vanish identically, but in practice the purely-repulsive states are usually omitted from the molecular treatment. The corresponding second virial coefficients, obtained by summing Eq. (1.6-10) only over the repulsive states, are somewhat larger than those obtained by using the complete sum, but still only about half as large as the coefficients estimated by Woolley (1960) by scaling down the molecule-molecule potentials.

1.7 Effects of Coulomb forces on the thermodynamic properties of ionized air

The Coulomb forces between the ions and electrons present in high-temperature air are sufficiently different from the intermolecular forces already considered as to require a separate treatment. When $U_{ij}(r) = \text{constant}/r$, the integral in Eq. (1.6-2) is found to diverge at $r = 0$ when the constant is negative (i.e., for charged particles of opposite sign), while for large r it behaves like $\pm \int r dr$ and diverges for both positive and negative Coulomb potentials. The divergence at $r = 0$ is due to inclusion of bound states; it may be removed by including only the states with energies above that of the separated particles, by use of Eq. (1.6-10). The divergence at $r = \infty$, however, is more fundamental. A uniform gas of charged particles which is not electrically neutral (i.e., has more positive than negative charges, or vice versa) can be shown to have a Coulomb energy per unit mass which depends upon the size and shape of the gas volume considered, and becomes infinite as

the volume goes to infinity (at fixed gas density). It is not surprising, then, that the virial coefficients for a Coulomb potential diverge. In an ionized gas with no net charge, the infinite positive and negative virial terms from the repulsive and attractive Coulomb forces, respectively, must somehow cancel to first order, leaving only a finite remainder.

If the charged-particle density is not too high, this problem can be treated by the Debye-Hückel theory, which determines the mean distribution of electrons and ions around any given electron or ion, using a linearized self-consistent-field approximation. Since the derivation and results are available in several texts (Fowler, 1936; Fowler and Guggenheim, 1956; Cambel, Duclos, and Anderson, 1963) they will not be reproduced here. Qualitatively, the effect of Coulomb interactions is to decrease the effective ionization potential of each species, and thus increase the degree of ionization. The interactions also decrease the pressure and energy of the ionized gas mixture directly, in contrast to the indirect increase due to the increased ionization, so that the net thermodynamic corrections are positive at some temperatures and densities and negative at others.

For present purposes, however, the conventional Debye-Hückel treatment needs to be supplemented by two additional considerations. The first concerns the dielectric constant. The original analysis of Debye and Hückel was applied to ions in solution, and since the force between adjacent ions is affected by the polarizability of the intervening liquid, the dielectric constant of the latter enters into the basic equations. A similar effect may be expected in an ionized gas whenever molecules, atoms, or polarizable ions are situated between neighboring ions, but in

gases the continuum fluid approximation and the use of the static dielectric constant will be less accurate. Fortunately, at gas densities and temperatures of present interest, the dielectric constant will not deviate more than a couple per cent from that of empty space, so that it can be approximated by the latter value, with an error less than the other errors inherent in the Debye-Hückel approach.

The second consideration involves the electronic-state "cutoff" introduced in Section 1.3. Conventional Debye-Hückel theory does not consider electronically-excited states. It does, however, give for the mean potential about each ion of charge Z :

$$U(r) = (Ze/r) \exp (-r/d) \quad , \quad (1.7-1)$$

where d is the Debye length, given by

$$d^2 = kT / \left(4\pi e^2 \sum_i \bar{N}_i Z_i^2 \right) \quad , \quad (1.7-2)$$

and the summation is taken over all charged particles, including electrons. Some workers have assumed that the higher excited states of each atom or ion are precisely the bound states of an electron in the Debye-Hückel potential, Eq. (1.7-1). This potential has only a finite number of bound states, so that the partition function converges. However, these states include a number having classical electron orbits with radii approaching the Debye length. Since the Debye-Hückel treatment is valid only when the Debye length is longer than the mean distance between ions (Cambel, Duclos, and Anderson, 1963), such states have a bound electron which is generally closer to other ions than to the ion to which it is presumed to be

bound. This is not reasonable. Moreover, from the viewpoint of classical statistical mechanics, in which an electron is characterized by a position and a momentum or energy, it is clear that such a procedure will give a partition function which counts portions of phase space more than once.

A better procedure is suggested by the classical approach: The entire volume of the gas can be divided into approximately spherical volume elements surrounding each ion, and the bound states within each element calculated. The volume elements may be taken of equal size, but when ions of different charges are present it is preferable to make the size of each element proportional to the charge of the ion it contains. Since the radii of the volume elements are smaller than the Debye-Hückel length d , it is reasonable to omit the exponential factor in Eq. (1.7-1), leaving just the ordinary Coulomb field. The lower bound states of electrons in this field will be just the Rydberg states already described in Section 1.3, while the higher ones will deviate due to the finite volume. However, for gas densities of present interest the latter states are high enough to be approximated classically. Classically, the bound electron is unaffected by the finite volume until its energy is sufficient to permit it to reach the boundary, at which point it ceases to be bound. This principle gives a cutoff quantum number for substitution in Eq. (1.3-10):

$$n_c^2 = Ry (Z + 1) r_{Z+1} / e^2, \quad (1.7-3)$$

where r_{Z+1} is the radius of the volume element about an ion of charge $Z + 1$ ($Z + 1$ appears instead of Z because a highly-excited atom or ion of charge Z is treated like an ion of charge $Z + 1$ plus an outer electron.)

1.3 Equilibrium calculations and results for air

Based on the theoretical relations presented in the preceding sections, a FORTRAN code has been written and equilibrium calculations carried out for air between 10,000 and 10,000,000°K, including the Debye-Hückel, variable electronic cutoff, and second virial corrections. The iteration process selected, based on the assumption that the molecular concentrations are smaller than the atomic ones, failed to converge for temperatures below 10,000°K at high densities. No attempt was made to modify it, due to lack of time and the adequacy of the earlier results of Hilsenrath and Klein (1963, 1965) in this lower temperature region.

The basic composition of normal air, used as input, was about the same as that used previously (Gilmore, 1955, 1959; Hilsenrath and Klein, 1963, 1965), except that the CO₂ concentration was decreased slightly in accordance with recent measurements (Kelley and La Chapelle, 1966), and the small amount of neon was lumped in with the argon. This gives the initial composition shown below:

<u>Molecule</u>	<u>Mole per cent</u>
N ₂	78.084
O ₂	20.946
Ar	0.938
CO ₂	0.032

The density range covered was from 10^{-9} to 10 times standard density, where the standard density is $1.2923 \times 10^{-3} \text{ g/cm}^3$, corresponding to the ideal gas mixture at 273.15°K and 1 atm pressure. At the lowest density considered the assumption of thermodynamic equilibrium might seem unrealistic in most practical situations. However, for energy densities corresponding to temperatures above about $10,000^\circ\text{K}$ many free electrons are usually present, and characteristic times for these electrons to equilibrate with each other and with the ion excitation and ionization are only a few milliseconds. Of course, equilibration of ion velocities will take a longer time (though often still short compared to radiative or hydrodynamic cooling times of large masses of air), but the ion kinetic energies make only a relatively small contribution to the total energy and pressure at the higher temperatures. Radiation will also depopulate nonmetastable states below their equilibrium concentrations, but even in equilibrium their populations are small, since at low densities ions tend to ionize further rather than become excited.

The calculated equilibrium compositions are presented graphically in Figs. 2.1 to 2.8. The concentrations of most species agree within a percent with the values of Hilsenrath and Klein (1963, 1965) up to $15,000^\circ\text{K}$, after correcting for the 3 percent smaller initial CO_2 concentration used in the present work. There are, however, differences of several percent in the molecular concentrations, due to use of improved diatomic thermodynamic properties and virial coefficients. Moreover, the O^- concentration is up to a factor of 2 lower, and the O_2^- concentration a couple orders of magnitude higher due to use of revised electron affinities. However, at all temperatures and densities considered the negative ion densities are more than an order of magnitude below the electron densities.

The calculated equilibrium thermodynamic properties are presented in Tables 102 to 111. These values agree within 1 percent with those of Hilsenrath and Klein up to 15,000°K. They also agree within 2 percent with the earlier values of the writer (Gilmcre, 1954, 1959) up to 24,000°K, and of Hilsenrath, Green, and Beckett (1957) up to 5,000,000°K, except for differences of several percent at the higher densities due to omission of virial and Debye-Hückel corrections from the earlier work.

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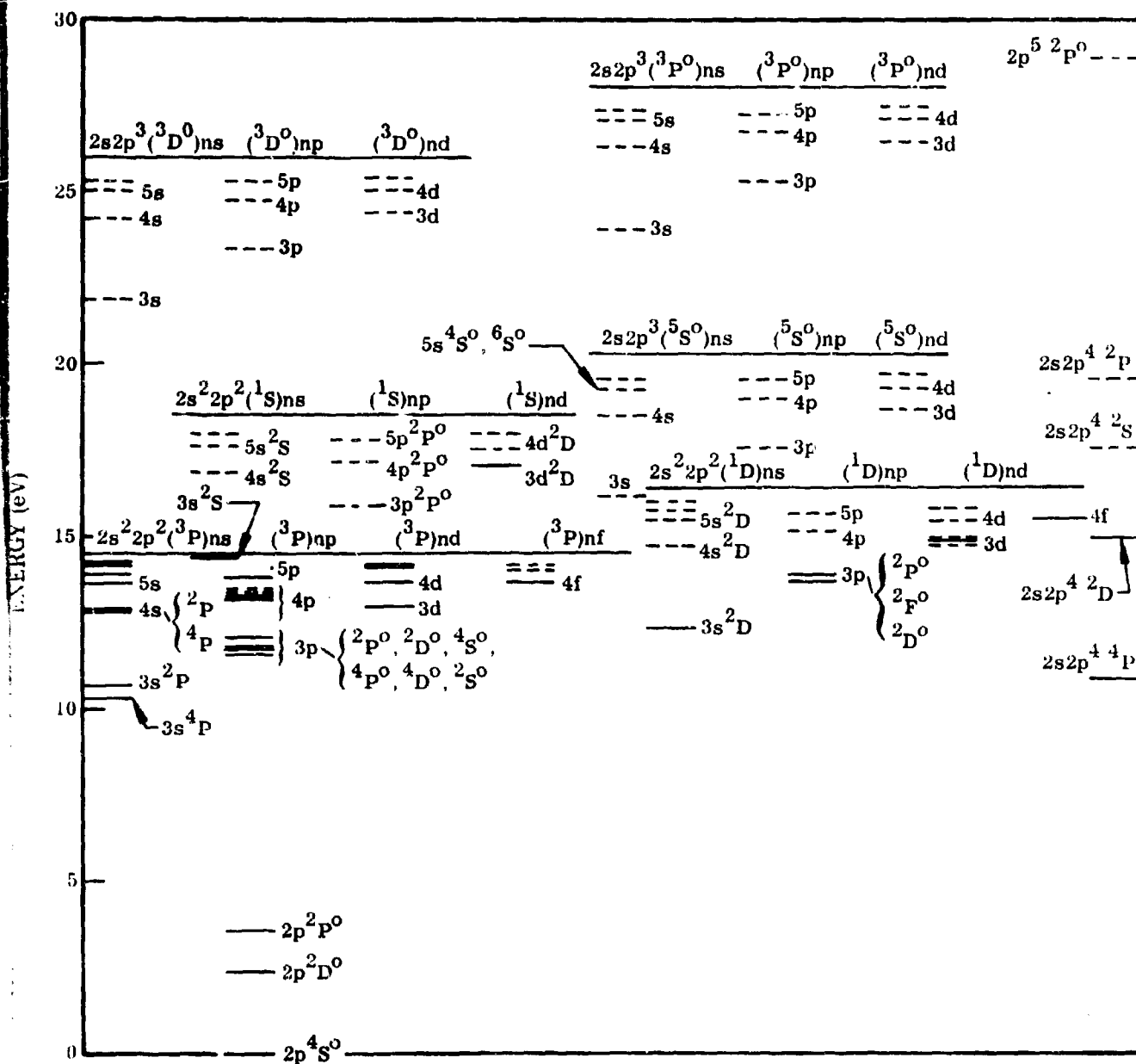


FIG. 1-1 ENERGY LEVELS OF THE NITROGEN ATOM BELOW 30 eV

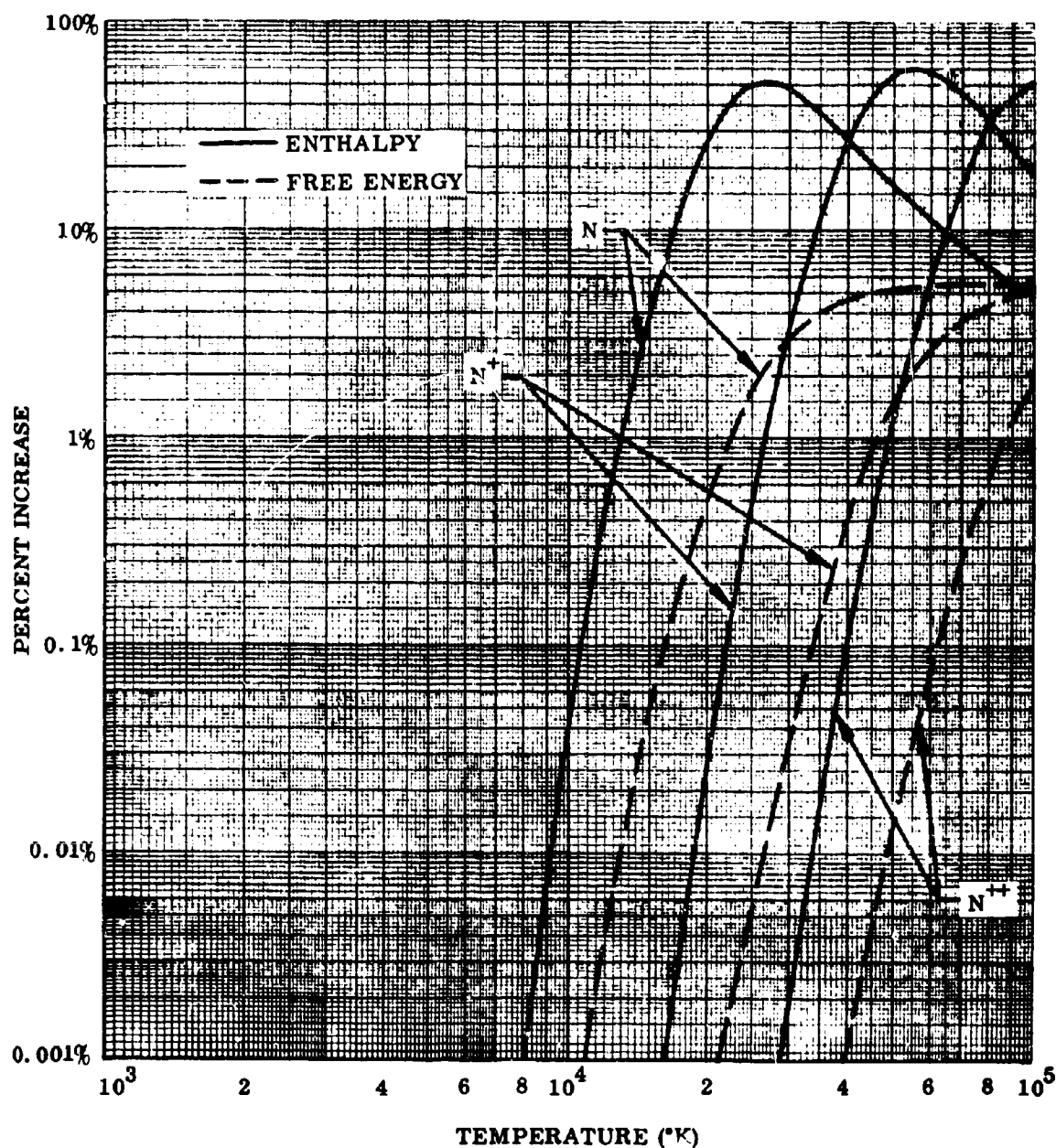
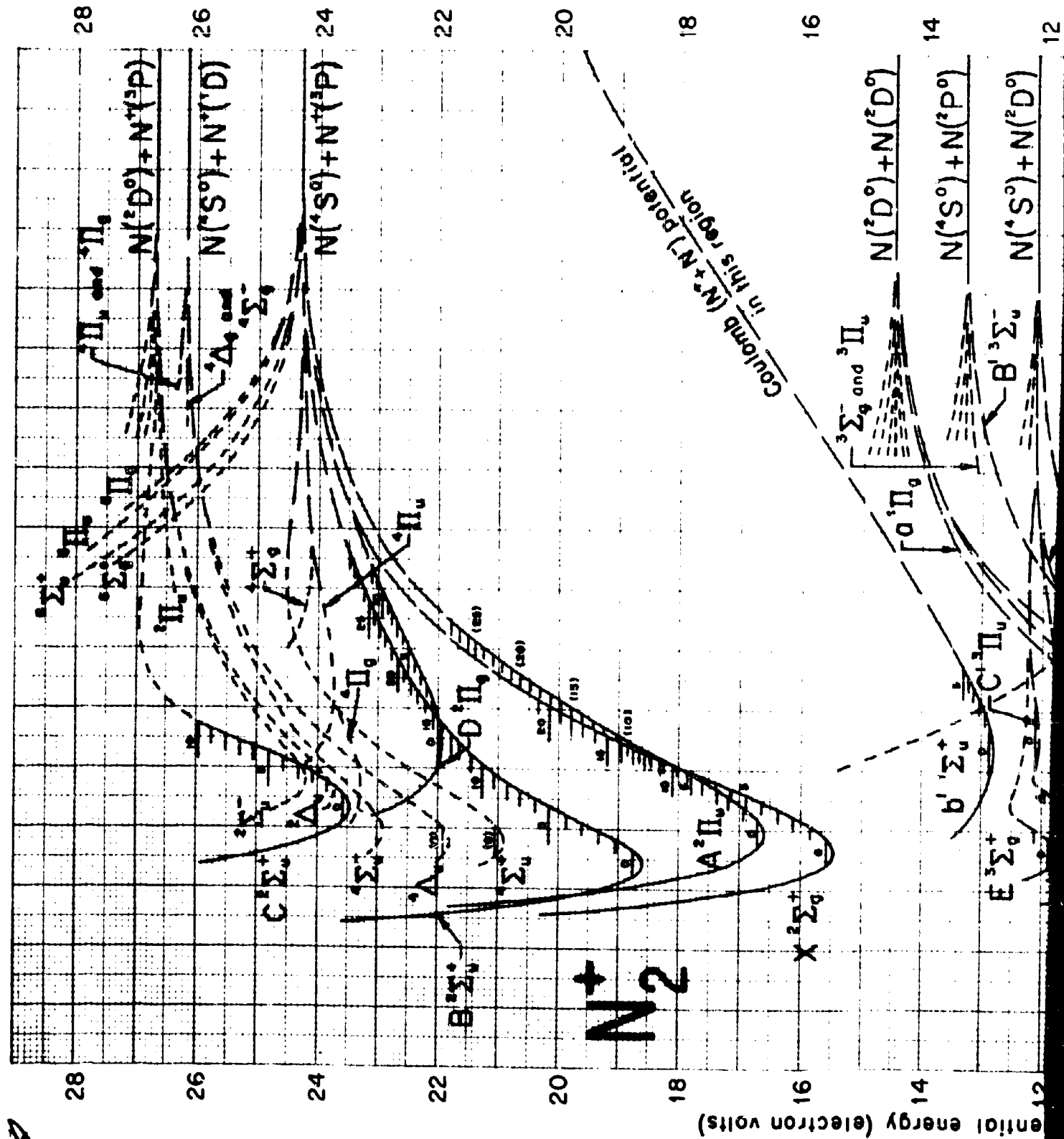


FIG. 1-2 PERCENT INCREASE IN THERMODYNAMIC FUNCTIONS FOR NITROGEN ATOMS AND IONS DUE TO SUMMING OVER ELECTRONIC LEVELS WITH $n \leq 8$ INSTEAD OF $n \leq 4$.



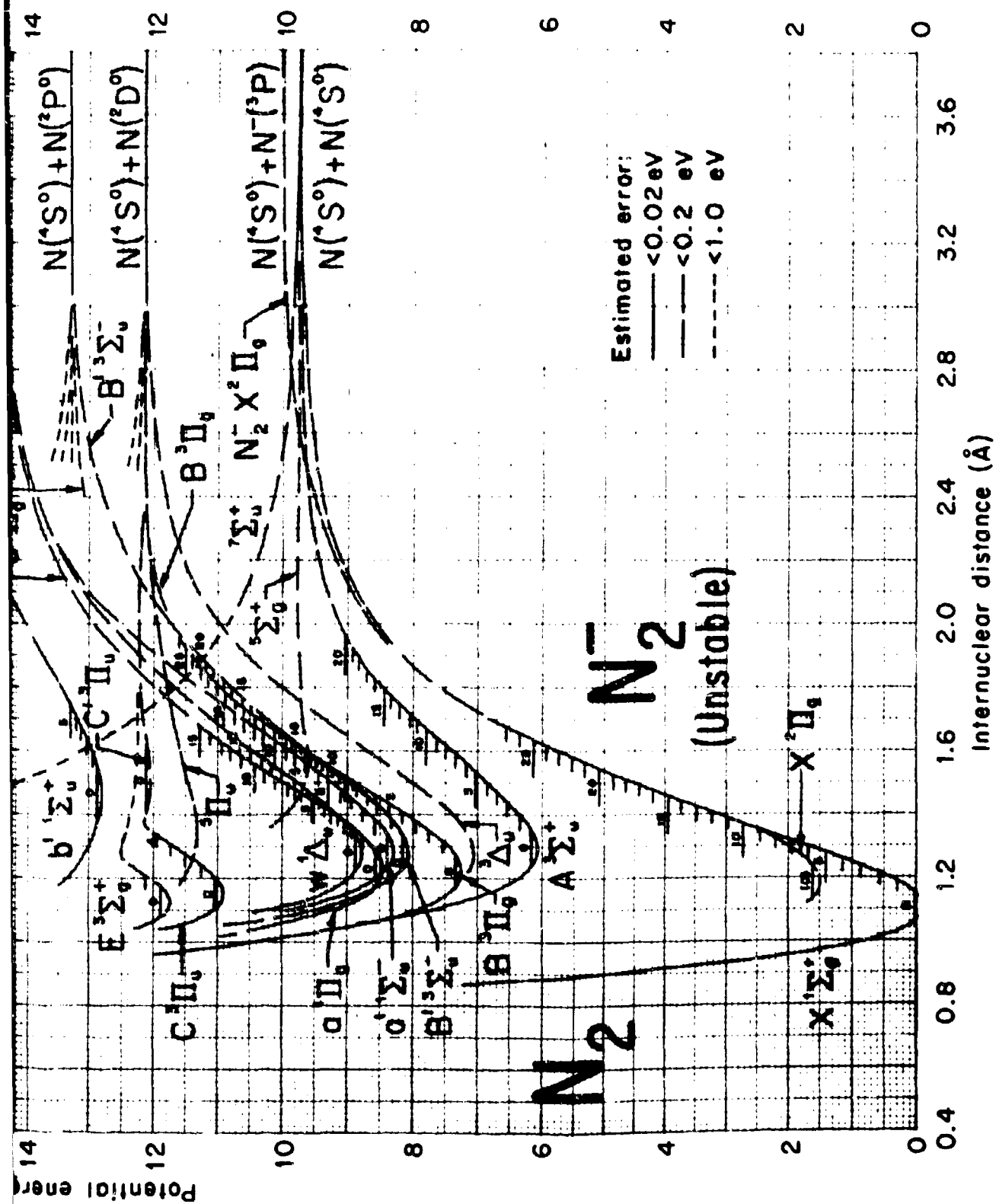


FIG. 1-3 POTENTIAL-ENERGY CURVES FOR N_2^- (UNSTABLE), N_2 and N_2^+ .

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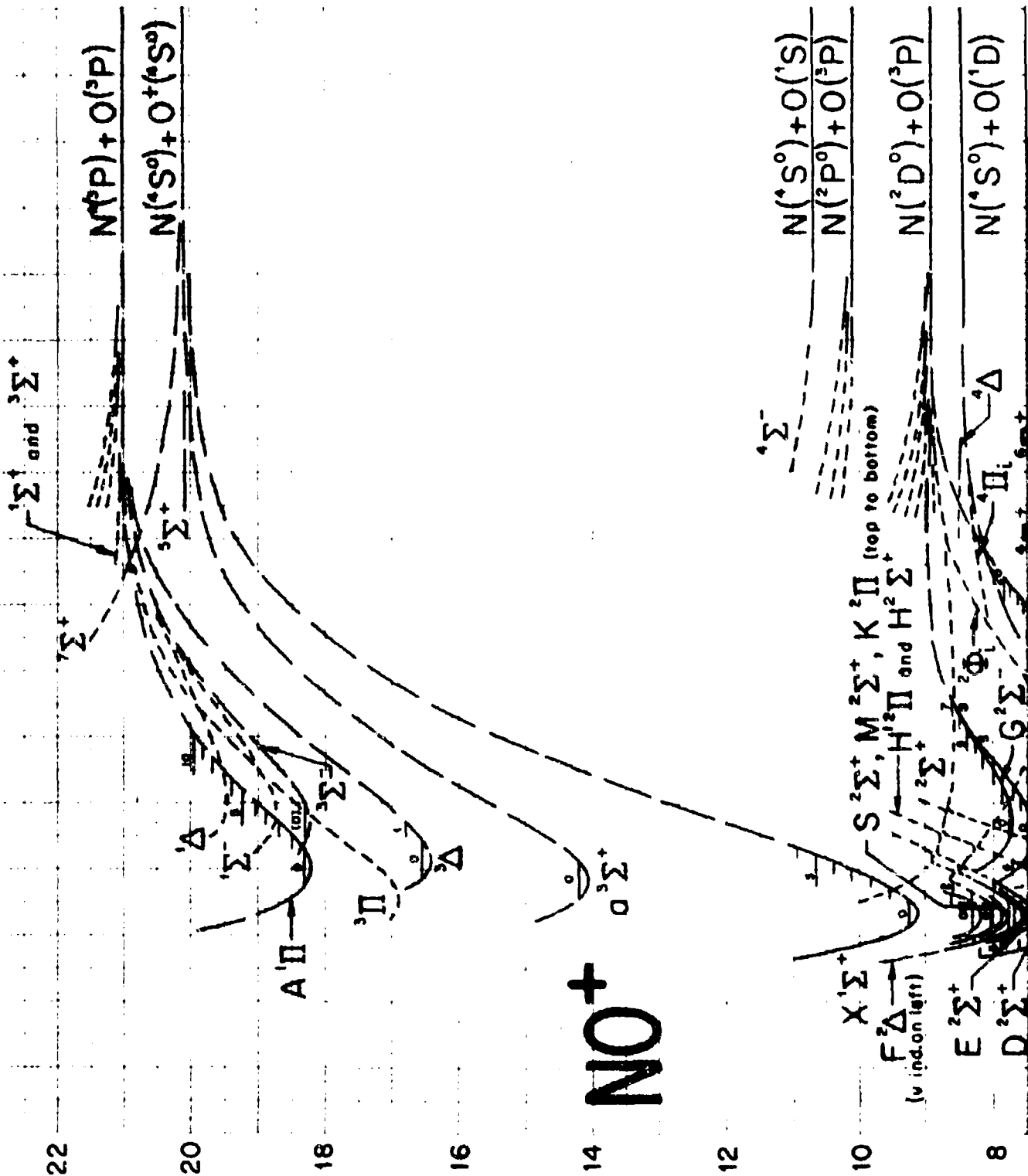
10

8

8

NO⁺

Potential energy (electron volts)



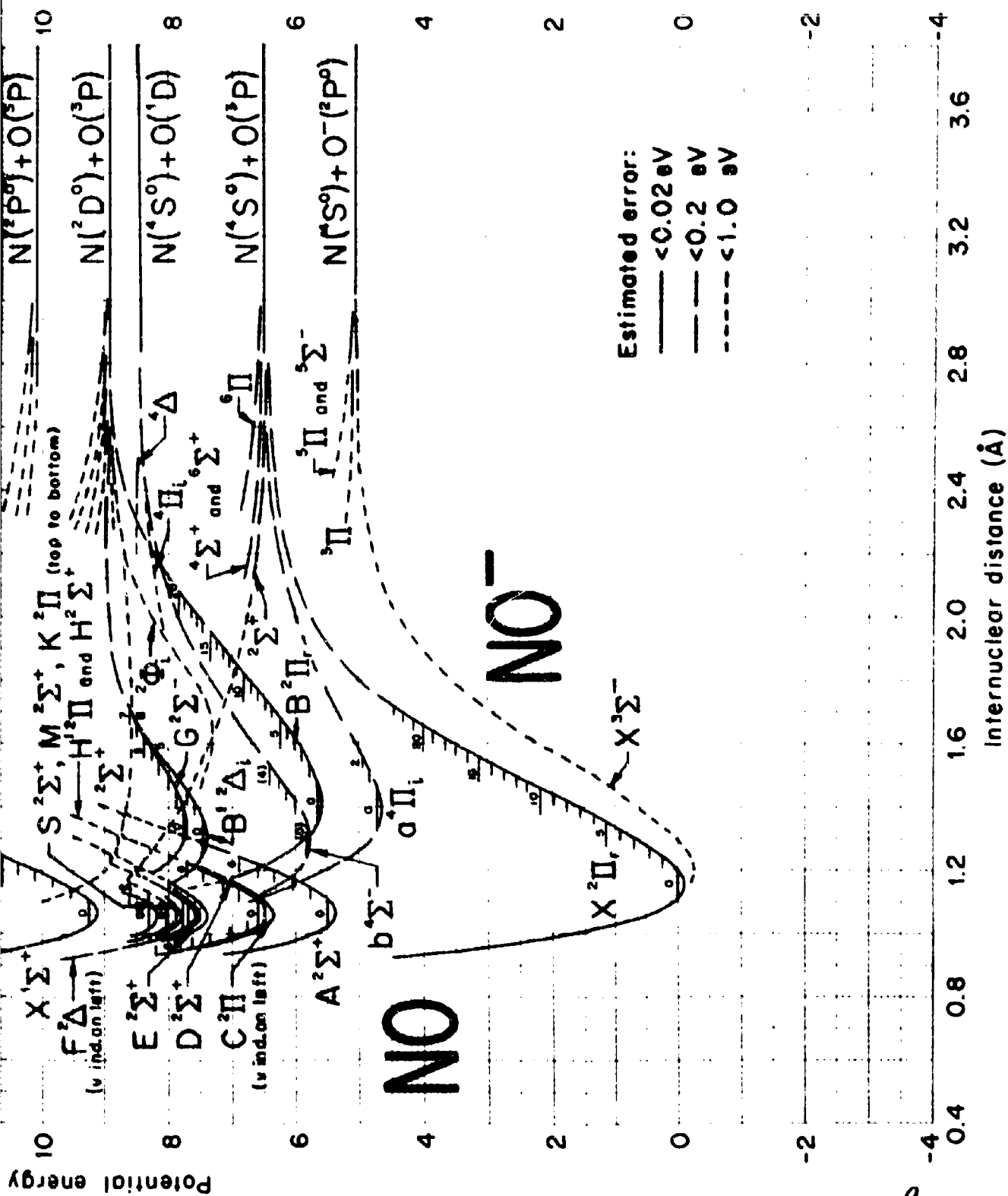
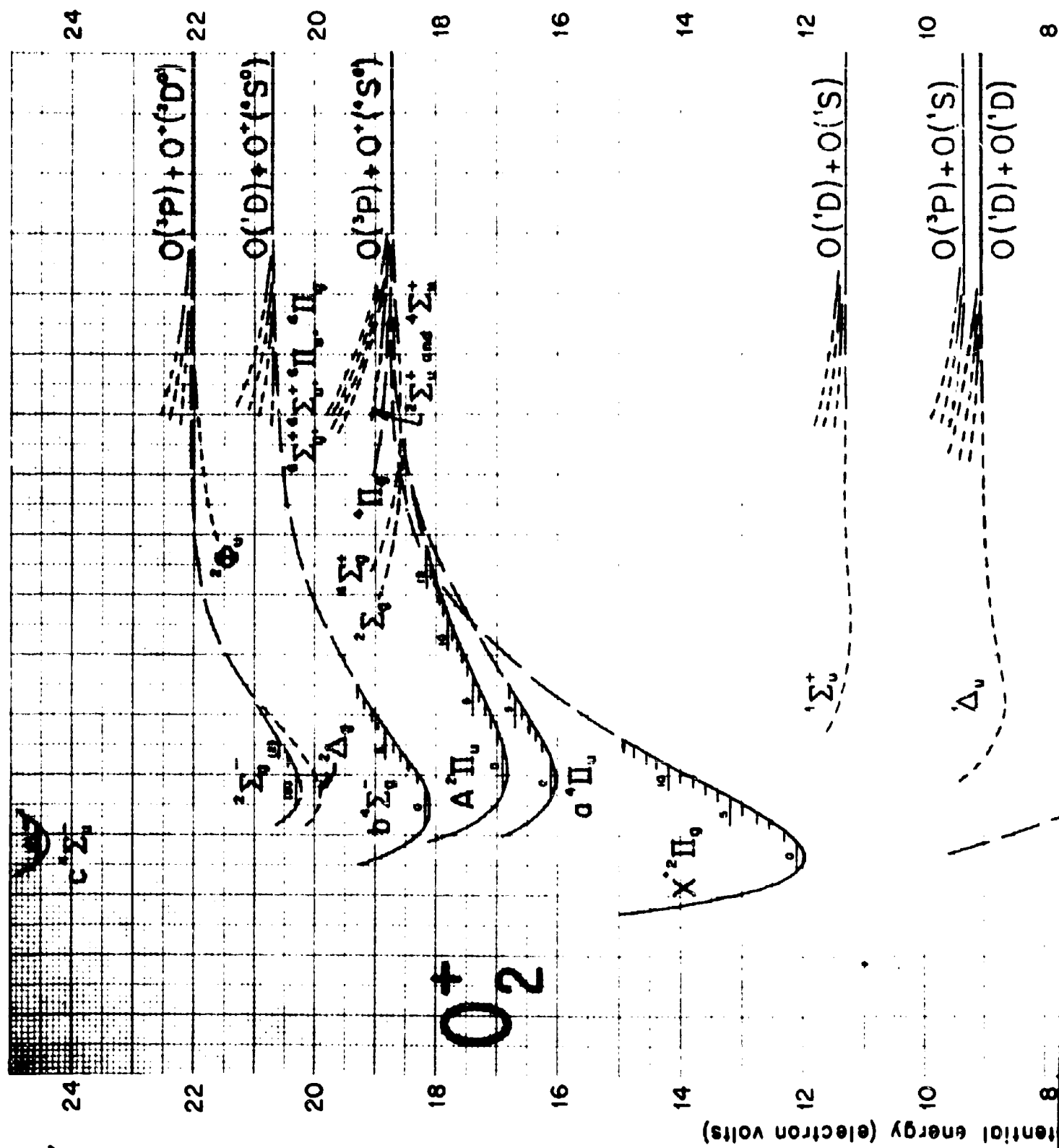


FIG. 1-4 POTENTIAL-ENERGY CURVES FOR NO^- , NO and NO^+ .



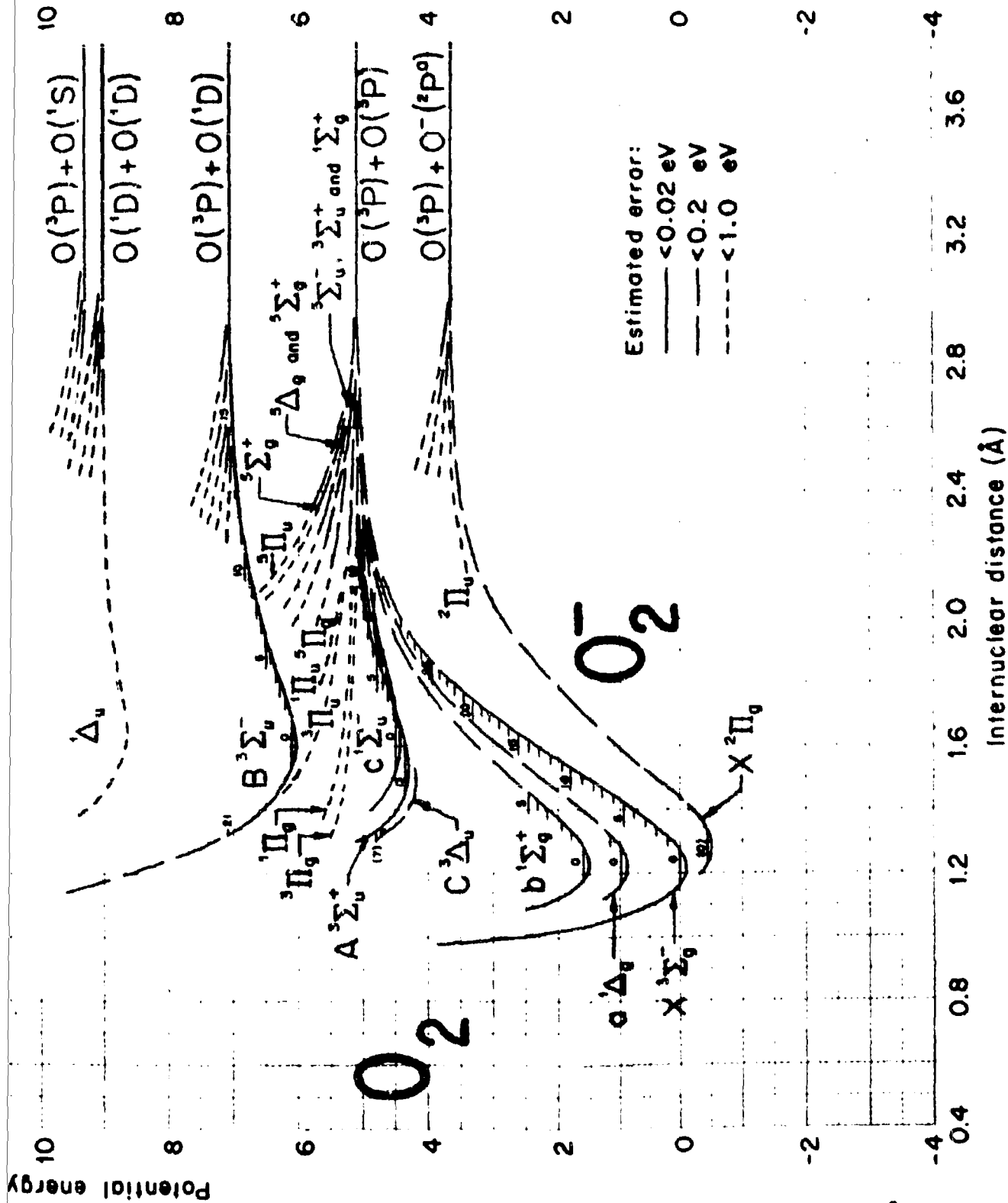


FIG. 1-5 POTENTIAL-ENERGY CURVES FOR O_2^- , O_2 and O_2^+ .

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Chapter 2. THE EQUILIBRIUM THERMODYNAMIC PROPERTIES OF HIGH-TEMPERATURE AIR: TABLES AND GRAPHS

This Chapter contains the following material:

1. Energy Zero for Air Species: Table 1.
2. Ideal-Gas Properties for Monatomic Air Species: Tables 2-45.
3. Energy Levels and Fractional Electronic Populations for Monatomic Air Species: Tables 46-85.
4. Spectroscopic Constants for Diatomic Air Species: Table 86.
5. Ideal-Gas Properties for Diatomic Air Species: Tables 87-94.
6. Fractional Electronic Populations for Diatomic Air Species: Tables 95-101.
7. Dimensionless Pressure, Pressure and Log of Pressure of Equilibrium Air, 10^4 to 10^7 °K 10^{-9} to 10 Fold Sea Level Air Density: Tables 102-104.
8. Dimensionless Internal Energy, Internal Energy and Internal Energy Density of Equilibrium Air, Same Temperature and Density Range As Above: Tables 105-107.
9. Enthalpy of Equilibrium Air, Same Temperature and Density Range As Above: Table 108.
10. Effective Gamma of Equilibrium Air, Same Temperature and Density Range As Above: Table 109.
11. Dimensionless Entropy of Equilibrium Air, Same Temperature and Density Range as Above: Table 110.
12. Equilibrium Composition of Air, 10^4 to 10^7 °K, 10^{-6} fold to Normal Sea Level Air Density: Figs. 2-1 to 2-8.

Table 1. Energy of Air Particles at 0°K

Species	$E_0^0(\text{cm}^{-1})$	Species	$E_0^0(\text{cm}^{-1})$	Species	$E_0^0(\text{cm}^{-1})$
CO ₂	0	N	39,359	Ar	0
NO ₂	3,065	N ⁺	156,573	Ar ⁺	127,110
NO ₂ ⁻	-29,100	N ⁺⁺	395,324	Ar ⁺⁺	349,958
N ₂	0	N ³⁺	777,950	Ar ³⁺	679,924
N ₂ ⁺	125,667	N ⁴⁺	1,402,801	Ar ⁴⁺	1,162,300
NO	7,506	N ⁵⁺	2,192,317	Ar ⁵⁺	1,767,400
NO ⁺	82,253	N ⁶⁺	6,645,117	Ar ⁶⁺	2,504,000
O ₂ ⁻	-3,470	N ⁷⁺	12,025,206	Ar ⁷⁺	3,504,000
O ₂	0	O ⁻	8,705	Ar ⁸⁺	4,661,800
O ₂ ⁺	97,295	O	20,630	Ar ⁹⁺	8,069,100
CO	23,351	O ⁺	130,467	Ar ¹⁰⁺	11,930,000
C	92,315	O ⁺⁺	413,711	Ar ¹¹⁺	16,277,000
C ⁺	183,129	O ³⁺	856,518	Ar ¹²⁺	21,263,600
C ⁺⁺	379,788	O ⁴⁺	1,480,915	Ar ¹³⁺	26,797,400
C ³⁺	766,002	O ⁵⁺	2,399,617	Ar ¹⁴⁺	32,892,900
C ⁴⁺	128,179	O ⁶⁺	3,513,617	Ar ¹⁵⁺	39,787,100
C ⁵⁺	4,448,629	O ⁷⁺	9,476,617	Ar ¹⁶⁺	47,196,400
C ⁶⁺	8,400,690	O ⁸⁺	16,505,010	Ar ¹⁷⁺	80,386,400
				Ar ¹⁸⁺	116,086,300

TABLE 2. IDEAL GAS FUNCTIONS FOR O- (ATOMIC WEIGHT 15.9999, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $N \leq 4$. SEE TABLE 46 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - E_0}{RT}$	$\ln \frac{h^2 - E_0}{RT} - \frac{E_0}{RT}$	$\frac{5}{2} R$	$\ln \frac{h^2 - E_0}{RT} - \frac{E_0}{RT} - \frac{5}{2} R$	$E - E_0$	$\frac{h^2 - E_0}{RT} - \frac{E_0}{RT} - \frac{5}{2} R$	$E - E_0$	TEMP. (°K)
1000	5.3272	2.60216	19.4361	22.0393	5.17092	38.4228	3.1838E 03	3.1838E 03	1000
1200	5.4311	2.58958	19.9094	22.4990	5.14592	39.5633	4.1705E 03	4.1705E 03	1200
1400	5.4922	2.57858	20.3078	22.9875	5.12405	40.7050	4.3944E 03	4.3944E 03	1400
1600	5.5478	2.57150	20.5917	23.2232	5.11000	41.0384	4.5641E 03	4.5641E 03	1600
1800	5.5926	2.56487	20.8542	23.5191	5.09682	41.6395	4.7743E 03	4.7743E 03	1800
2000	5.6292	2.55834	21.2252	23.7835	5.08583	42.1759	4.9173E 03	4.9173E 03	2000
2200	5.6599	2.55266	21.4679	24.0225	5.07654	42.7367	5.0110E 03	5.0110E 03	2200
2400	5.6859	2.54704	21.6900	24.2406	5.06858	43.1015	5.0953E 03	5.0953E 03	2400
2600	5.7082	2.54270	21.8940	24.4412	5.06170	43.5070	5.1708E 03	5.1708E 03	2600
2800	5.7275	2.53847	22.0826	24.6268	5.05569	43.8819	5.2381E 03	5.2381E 03	2800
3000	5.7445	2.53451	22.2561	24.7995	5.05040	44.2305	5.2977E 03	5.2977E 03	3000
3200	5.7595	2.53015	22.4220	24.9612	5.04570	44.5563	5.3503E 03	5.3503E 03	3200
3400	5.7728	2.52704	22.5759	25.1129	5.04151	44.8620	5.3969E 03	5.3969E 03	3400
3600	5.7847	2.52314	22.7209	25.2540	5.03775	45.1501	5.4378E 03	5.4378E 03	3600
3800	5.7954	2.51943	22.8578	25.3913	5.03434	45.4224	5.4730E 03	5.4730E 03	3800
4000	5.8051	2.51588	22.9878	25.5197	5.03126	45.6805	5.5025E 03	5.5025E 03	4000
4200	5.8140	2.51246	23.1113	25.6417	5.02845	45.9259	5.5264E 03	5.5264E 03	4200
4400	5.8220	2.50917	23.2290	25.7581	5.02587	46.1598	5.5448E 03	5.5448E 03	4400
4600	5.8294	2.50598	23.3414	25.8693	5.02350	46.3832	5.5578E 03	5.5578E 03	4600
4800	5.8362	2.50288	23.4489	25.9758	5.02132	46.5969	5.5654E 03	5.5654E 03	4800
5000	5.8425	2.50000	23.5521	26.0779	5.01931	46.7918	5.5677E 03	5.5677E 03	5000
5200	5.8483	2.49729	23.6511	26.1760	5.01744	46.9807	5.5648E 03	5.5648E 03	5200
5400	5.8538	2.49465	23.7444	26.2704	5.01570	47.1660	5.5618E 03	5.5618E 03	5400
5600	5.8588	2.49207	23.8323	26.3614	5.01408	47.3704	5.5587E 03	5.5587E 03	5600
5800	5.8635	2.48954	23.9267	26.4492	5.01251	47.5663	5.5555E 03	5.5555E 03	5800
6000	5.8679	2.48707	24.0122	26.5340	5.01114	47.7162	5.5522E 03	5.5522E 03	6000
6200	5.8720	2.48465	24.0949	26.6160	5.00981	47.8805	5.5488E 03	5.5488E 03	6200
6400	5.8759	2.48227	24.1749	26.6954	5.00856	48.0395	5.5453E 03	5.5453E 03	6400
6600	5.8795	2.47994	24.2525	26.7723	5.00738	48.1936	5.5418E 03	5.5418E 03	6600
6800	5.8830	2.47766	24.3277	26.8470	5.00627	48.3431	5.5383E 03	5.5383E 03	6800
7000	5.8862	2.47543	24.4007	26.9195	5.00522	48.4882	5.5348E 03	5.5348E 03	7000
7200	5.8893	2.47325	24.4716	26.9899	5.00422	48.6292	5.5313E 03	5.5313E 03	7200
7400	5.8922	2.47112	24.5404	27.0584	5.00327	48.7663	5.5278E 03	5.5278E 03	7400
7600	5.8950	2.46904	24.6078	27.1251	5.00238	48.8997	5.5243E 03	5.5243E 03	7600
7800	5.8976	2.46702	24.6732	27.1901	5.00153	49.0296	5.5208E 03	5.5208E 03	7800
8000	5.9001	2.46505	24.7369	27.2534	5.00072	49.1563	5.5173E 03	5.5173E 03	8000
8200	5.9024	2.46312	24.7990	27.3151	5.00000	49.2797	5.5138E 03	5.5138E 03	8200
8400	5.9047	2.46124	24.8596	27.3754	5.00000	49.3994	5.5103E 03	5.5103E 03	8400
8600	5.9069	2.45941	24.9188	27.4342	5.00000	49.5157	5.5068E 03	5.5068E 03	8600
8800	5.9089	2.45763	24.9767	27.4917	5.00000	49.6287	5.5033E 03	5.5033E 03	8800
9000	5.9109	2.45590	25.0332	27.5479	5.00000	49.7380	5.5000E 03	5.5000E 03	9000
9200	5.9128	2.45422	25.0884	27.6029	5.00000	49.8449	5.4967E 03	5.4967E 03	9200
9400	5.9144	2.45259	25.1425	27.6566	5.00000	49.9497	5.4934E 03	5.4934E 03	9400
9600	5.9164	2.45104	25.1954	27.7093	5.00000	50.0521	5.4901E 03	5.4901E 03	9600
9800	5.9180	2.44956	25.2473	27.7608	5.00000	50.1525	5.4868E 03	5.4868E 03	9800

TABLE 2 (CONT.). IDEAL GAS FUNCTIONS FOR O-

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	$\frac{h^2}{8\pi^2}$	TEMP. (°K)
10000	5.9194	2.5133	25.5965	27.8113	4.99434	50.2714	55.2637	3.0072E 04	4.9943E 04	5.271E 05	10000	
10500	5.9234	2.5126	25.5207	27.9333	4.99311	50.5150	55.5002	3.1562E 04	5.2620E 04	5.3001E 05	10500	
11000	5.9268	2.5121	25.5375	28.0497	4.99200	50.7473	55.7393	3.3053E 04	5.4912E 04	5.5022E 05	11000	
11500	5.9299	2.5115	25.5492	28.1608	4.99097	50.9632	55.9602	3.4544E 04	5.7394E 04	5.8619E 05	11500	
12000	5.9328	2.5111	25.5561	28.2672	4.99004	51.1816	56.1716	3.6034E 04	5.9900E 04	6.1611E 05	12000	
12500	5.9355	2.5107	25.5596	28.3693	4.98917	51.3953	56.3764	3.7523E 04	6.2362E 04	6.4232E 05	12500	
13000	5.9379	2.5102	25.5570	28.4673	4.98837	51.6009	56.5693	3.9014E 04	6.4694E 04	6.7059E 05	13000	
13500	5.9402	2.5098	25.5518	28.5617	4.98763	51.7982	56.7568	4.0504E 04	6.7333E 04	6.9666E 05	13500	
14000	5.9423	2.5095	25.5440	28.6526	4.98694	51.9865	56.9375	4.1997E 04	6.9817E 04	7.2731E 05	14000	
14500	5.9442	2.5092	25.5345	28.7403	4.98629	52.1655	57.1118	4.3487E 04	7.2301E 04	7.5502E 05	14500	
4.4978E 04	7.4789E 04	7.8442E 05	15500	5.9478	2.50864	26.3904	28.9071	4.90313	52.4580	57.4432		
BAD BLOCK SKIPPED												
16500	5.9509	2.5081	25.5253	28.8334	4.98610	52.3497	57.2538	4.5042E 04	8.2230E 04	8.7070E 05	16500	
17000	5.9523	2.5079	25.5201	28.9380	4.98563	52.5105	57.5021	5.0540E 04	8.4722E 04	8.9961E 05	17000	
17500	5.9537	2.5076	25.5148	29.0405	4.98519	52.6629	58.0461	5.2430E 04	8.7204E 04	9.2800E 05	17500	
18000	5.9550	2.5074	25.5093	29.1409	4.98477	52.8033	58.1863	5.3921E 04	8.9690E 04	9.5764E 05	18000	
18500	5.9562	2.5072	25.5042	29.2384	4.98438	52.9398	58.3222	5.5411E 04	9.2174E 04	9.8679E 05	18500	
19000	5.9573	2.5070	25.5000	29.3338	4.98400	53.0727	58.4567	5.6902E 04	9.4650E 04	1.0160E 06	19000	
19500	5.9584	2.5068	25.4961	29.4261	4.98365	53.2101	58.5897	5.8392E 04	9.7142E 04	1.0452E 06	19500	
20000	5.9594	2.5067	25.4924	29.5163	4.98331	53.3422	58.7205	5.9883E 04	9.9624E 04	1.0744E 06	20000	
20500	5.9604	2.5065	25.4886	29.6044	4.98298	53.4699	58.8493	6.1374E 04	1.0192E 05	1.1036E 06	20500	
21000	5.9614	2.5063	25.4848	29.6905	4.98266	53.5933	58.9763	6.2865E 04	1.0430E 05	1.1328E 06	21000	
21500	5.9623	2.5061	25.4810	29.7746	4.98235	53.7133	59.1019	6.4356E 04	1.0668E 05	1.1620E 06	21500	
22000	5.9631	2.5059	25.4772	29.8567	4.98204	53.8303	59.2259	6.5847E 04	1.0906E 05	1.1912E 06	22000	
22500	5.9639	2.5057	25.4734	29.9368	4.98173	53.9453	59.3483	6.7338E 04	1.1144E 05	1.2204E 06	22500	
23000	5.9646	2.5055	25.4696	30.0149	4.98143	54.0583	59.4693	6.8829E 04	1.1382E 05	1.2496E 06	23000	
23500	5.9653	2.5053	25.4658	30.0910	4.98113	54.1693	59.5883	7.0320E 04	1.1620E 05	1.2788E 06	23500	
24000	5.9659	2.5051	25.4620	30.1661	4.98083	54.2783	59.7053	7.1811E 04	1.1858E 05	1.3080E 06	24000	
24500	5.9665	2.5049	25.4582	30.2392	4.98053	54.3853	59.8203	7.3302E 04	1.2096E 05	1.3372E 06	24500	
25000	5.9671	2.5047	25.4544	30.3113	4.98023	54.4903	59.9343	7.4793E 04	1.2334E 05	1.3664E 06	25000	
25500	5.9677	2.5045	25.4506	30.3824	4.97993	54.5933	60.0473	7.6284E 04	1.2572E 05	1.3956E 06	25500	
26000	5.9682	2.5043	25.4468	30.4525	4.97963	54.6943	60.1593	7.7775E 04	1.2810E 05	1.4248E 06	26000	
26500	5.9687	2.5041	25.4430	30.5216	4.97933	54.7933	60.2703	7.9266E 04	1.3048E 05	1.4540E 06	26500	
27000	5.9692	2.5039	25.4392	30.5897	4.97903	54.8903	60.3803	8.0757E 04	1.3286E 05	1.4832E 06	27000	
27500	5.9697	2.5037	25.4354	30.6568	4.97873	54.9853	60.4893	8.2248E 04	1.3524E 05	1.5124E 06	27500	
28000	5.9702	2.5035	25.4316	30.7229	4.97843	55.0783	60.5973	8.3739E 04	1.3762E 05	1.5416E 06	28000	
28500	5.9707	2.5033	25.4278	30.7880	4.97813	55.1693	60.7043	8.5230E 04	1.3999E 05	1.5708E 06	28500	
29000	5.9712	2.5031	25.4240	30.8521	4.97783	55.2583	60.8103	8.6721E 04	1.4237E 05	1.6000E 06	29000	
29500	5.9717	2.5029	25.4202	30.9152	4.97753	55.3453	60.9153	8.8212E 04	1.4475E 05	1.6292E 06	29500	
30000	5.9722	2.5027	25.4164	30.9773	4.97723	55.4303	61.0193	8.9703E 04	1.4713E 05	1.6584E 06	30000	
30500	5.9727	2.5025	25.4126	31.0384	4.97693	55.5133	61.1223	9.1194E 04	1.4951E 05	1.6876E 06	30500	
31000	5.9732	2.5023	25.4088	31.0985	4.97663	55.5943	61.2243	9.2685E 04	1.5189E 05	1.7168E 06	31000	
31500	5.9737	2.5021	25.4050	31.1576	4.97633	55.6733	61.3253	9.4176E 04	1.5427E 05	1.7460E 06	31500	
32000	5.9742	2.5019	25.4012	31.2157	4.97603	55.7503	61.4253	9.5667E 04	1.5665E 05	1.7752E 06	32000	
32500	5.9747	2.5017	25.3974	31.2728	4.97573	55.8253	61.5243	9.7158E 04	1.5903E 05	1.8044E 06	32500	
33000	5.9752	2.5015	25.3936	31.3289	4.97543	55.9003	61.6223	9.8649E 04	1.6141E 05	1.8336E 06	33000	
33500	5.9757	2.5013	25.3898	31.3840	4.97513	55.9733	61.7193	1.0014E 05	1.6379E 05	1.8628E 06	33500	
34000	5.9762	2.5011	25.3860	31.4381	4.97483	56.0453	61.8153	1.0163E 05	1.6617E 05	1.8920E 06	34000	
34500	5.9767	2.5009	25.3822	31.4912	4.97453	56.1163	61.9103	1.0312E 05	1.6855E 05	1.9212E 06	34500	
35000	5.9772	2.5007	25.3784	31.5443	4.97423	56.1863	62.0043	1.0461E 05	1.7093E 05	1.9504E 06	35000	
35500	5.9777	2.5005	25.3746	31.5964	4.97393	56.2553	62.0973	1.0610E 05	1.7331E 05	1.9796E 06	35500	
36000	5.9782	2.5003	25.3708	31.6485	4.97363	56.3233	62.1893	1.0759E 05	1.7569E 05	2.0088E 06	36000	
36500	5.9787	2.5001	25.3670	31.7006	4.97333	56.3903	62.2803	1.0908E 05	1.7807E 05	2.0380E 06	36500	
37000	5.9792	2.5000	25.3632	31.7517	4.97303	56.4563	62.3703	1.1057E 05	1.8045E 05	2.0672E 06	37000	
37500	5.9797	2.4998	25.3594	31.8028	4.97273	56.5213	62.4593	1.1206E 05	1.8283E 05	2.0964E 06	37500	
38000	5.9802	2.4996	25.3556	31.8529	4.97243	56.5853	62.5473	1.1355E 05	1.8521E 05	2.1256E 06	38000	
38500	5.9807	2.4994	25.3518	31.9020	4.97213	56.6483	62.6343	1.1504E 05	1.8759E 05	2.1548E 06	38500	
39000	5.9812	2.4992	25.3480	31.9501	4.97183	56.7103	62.7203	1.1653E 05	1.8997E 05	2.1840E 06	39000	
39500	5.9817	2.4990	25.3442	32.0002	4.97153	56.7713	62.8053	1.1802E 05	1.9235E 05	2.2132E 06	39500	
40000	5.9822	2.4988	25.3404	32.0493	4.97123	56.8313	62.8893	1.1951E 05	1.9473E 05	2.2424E 06	40000	
40500	5.9827	2.4986	25.3366	32.0974	4.97093	56.8903	62.9723	1.2100E 05	1.9711E 05	2.2716E 06	40500	
41000	5.9832	2.4984	25.3328	32.1455	4.97063	56.9483	63.0543	1.2249E 05	1.9949E 05	2.3008E 06	41000	
41500	5.9837	2.4982	25.3290	32.1936	4.97033	57.0053	63.1353	1.2398E 05	2.0187E 05	2.3300E 06	41500	
42000	5.9842	2.4980	25.3252	32.2417	4.97003	57.0643	63.2153	1.2547E 05	2.0425E 05	2.3592E 06	42000	
42500	5.9847	2.4978	25.3214	32.2898	4.96973	57.1223	63.2943	1.2696E 05	2.0663E 05	2.3884E 06	42500	
43000	5.9852	2.4976	25.3176	32.3379	4.96943	57.1793	63.3723	1.2845E 05	2.0901E 05	2.4176E 06	43000	
43500	5.9857	2.4974	25.3138	32.3850	4.96913	57.2353	63.4493	1.2994E 05	2.1139E 05	2.4468E 06	43500	
44000	5.9862	2.4972	25.3100	32.4321	4.96883	57.2903	63.5253	1.3143E 05	2.1377E 05	2.4760E 06	44000	
44500	5.9867	2.4970	25.3062	32.4792	4.96853	57.3443	63.6003	1.3292E 05	2.1615E 05	2.5052E 06	44500	
45000	5.9872	2.4968	25.3024	32.5263	4.96823	57.3973	63.6743	1.3441E 05	2.1853E 05	2.5344E 06	45000	
45500	5.9877	2.4966	25.2986	32.5734	4.96793	57.4503	63.7473	1.3590E 05	2.2091E 05	2.5636E 06	45500	
46000	5.9882	2.4964	25.2948	32.6205	4.96763	57.5023	63.8193	1.3739E 05	2.2329E 05	2.5928E 06	46000	
46500	5.9887	2.4962	25.2910	32.6676	4.96733	57.5543	63.8903	1.3888E 05	2.2567E 05	2.6220E 06	46500	
47000	5.9892	2.4960	25.2872	32.7147	4.96703	57.6053	63.9603	1.4037E 05	2.2805E 05	2.6512E 06	47000	
47500	5.9897	2.4958	25.2834	32.7618	4.96673	57.6563	64.0293	1.4186E 05	2.3043E 05	2.6804E 06	47500	
48000	5.9902	2.4956	25.2796	32.8089	4.96643	57.7073	64.0973	1.4335E 05	2.3281E 05	2.7096E 06	48000	
48500	5.9907	2.4954	25.2758	32.8560	4.96613	57.7573	64.1643	1.4484E 05	2.3519E 05	2.7388E 06	48500	
49000	5.9912	2.4952	25.2720	32.9031	4.96583	57.8073	64.2303	1.4633E 05	2.3757E 05	2.7680E 06	49000	
49500	5.9917	2.4950	25.2682	32.9502	4.96553	57.8573	64.2953	1.4782E 05	2.3995E 05	2.7972E 06	49500	
50000	5.9922	2										

TABLE 3. IDEAL GAS FUNCTIONS FOR C (ATOMIC WEIGHT 12.0112, R = 1.98717 CAL/MOLE)

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $N \leq 4$. SEE TABLE 47 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 - E_0}{RT}$	$\ln \frac{h^2 - E_0}{RT}$	$\frac{h^2 - E_0}{RT}$	$\ln \frac{h^2 - E_0}{RT}$	$\frac{h^2 - E_0}{RT}$	$\ln \frac{h^2 - E_0}{RT}$	$\frac{h^2 - E_0}{RT}$	$\ln \frac{h^2 - E_0}{RT}$	TEMP. (°K)
1000	8.6287	2.84209	19.4880	22.0301	5.05156	38.7260	43.7775	3.0644E 03	5.0516E 03	1000
1200	8.6875	2.53519	19.9509	22.4861	5.03783	39.6457	44.6835	3.6408E 03	5.0516E 03	1200
1400	8.7314	2.30394	20.3413	22.8716	5.02812	40.4215	45.4497	4.2575E 03	7.0395E 03	1400
1600	8.7648	2.12698	20.6789	23.2059	5.02152	41.0925	46.1140	4.8944E 03	8.0344E 03	1600
1800	8.7915	2.00085	20.9764	23.5013	5.01730	41.6837	46.7100	5.4942E 03	9.0311E 03	1800
2000	8.8140	2.52269	21.2424	23.7663	5.01539	42.2122	47.2776	6.0545E 03	1.0031E 04	2000
2200	8.8341	2.52406	21.4830	24.0070	5.01520	42.6902	47.7059	6.6248E 03	1.1035E 04	2200
2400	8.8530	2.52531	21.7026	24.2279	5.01620	43.1267	48.1449	7.2745E 03	1.2044E 04	2400
2600	8.8717	2.52758	21.9048	24.4324	5.02271	43.5285	48.5912	7.9924E 03	1.3059E 04	2600
2800	8.8909	2.53077	22.0923	24.6230	5.02904	43.9010	48.9300	8.5173E 03	1.4081E 04	2800
3000	8.9109	2.53478	22.2670	24.8016	5.03703	44.2482	49.2852	9.1496E 03	1.5111E 04	3000
3200	8.9325	2.53948	22.4307	24.9702	5.04637	44.5736	49.6199	9.7995E 03	1.6148E 04	3200
3400	8.9551	2.54474	22.5848	25.1294	5.05683	44.8798	49.9364	1.0437E 04	1.7193E 04	3400
3600	8.9784	2.55045	22.7305	25.2809	5.06816	45.1692	50.2373	1.1092E 04	1.8245E 04	3600
3800	8.9954	2.55648	22.8685	25.4250	5.08015	45.4435	50.5237	1.1753E 04	1.9305E 04	3800
4000	9.0336	2.56274	22.9998	25.5625	5.09260	45.7044	50.7970	1.2422E 04	2.0370E 04	4000
4200	9.0621	2.56915	23.1259	25.6941	5.10532	45.9532	51.0595	1.3096E 04	2.1442E 04	4200
4400	9.0926	2.57561	23.2467	25.8203	5.11817	46.1910	51.3091	1.3774E 04	2.2520E 04	4400
4600	9.1248	2.58200	23.3635	25.9414	5.13102	46.4168	51.5498	1.4462E 04	2.3603E 04	4600
4800	9.1577	2.58850	23.4763	26.0578	5.14377	46.6374	51.7812	1.5152E 04	2.4699E 04	4800
5000	9.1920	2.59483	23.5751	26.1699	5.15635	46.8477	52.0040	1.5844E 04	2.5782E 04	5000
5200	9.2274	2.60103	23.6770	26.2780	5.16868	47.0501	52.2188	1.6544E 04	2.6877E 04	5200
5400	9.2637	2.60710	23.7753	26.3824	5.18073	47.2454	52.4262	1.7245E 04	2.7976E 04	5400
5600	9.3009	2.61300	23.8702	26.4832	5.19246	47.4341	52.6285	1.7948E 04	2.9078E 04	5600
5800	9.3387	2.61873	23.9620	26.5807	5.20384	47.6165	52.8263	1.8657E 04	3.0182E 04	5800
6000	9.3773	2.62428	24.0509	26.6752	5.21487	47.7931	53.0209	1.9344E 04	3.1289E 04	6000
6200	9.4164	2.62965	24.1370	26.7667	5.22554	47.9642	53.1808	2.0078E 04	3.2398E 04	6200
6400	9.4560	2.63484	24.2206	26.8554	5.23586	48.1303	53.3442	2.0792E 04	3.3509E 04	6400
6600	9.4961	2.63985	24.3017	26.9416	5.24582	48.2916	53.5374	2.1497E 04	3.4622E 04	6600
6800	9.5365	2.64470	24.3806	27.0253	5.25545	48.4483	53.7038	2.2224E 04	3.5737E 04	6800
7000	9.5772	2.64936	24.4574	27.1067	5.26475	48.6008	53.8455	2.2943E 04	3.6853E 04	7000
7200	9.6182	2.65391	24.5320	27.1860	5.27375	48.7492	54.0230	2.3643E 04	3.7971E 04	7200
7400	9.6595	2.65829	24.6048	27.2631	5.28244	48.8939	54.1743	2.4330E 04	3.9090E 04	7400
7600	9.7009	2.66255	24.6758	27.3383	5.29092	49.0348	54.3258	2.5008E 04	4.0211E 04	7600
7800	9.7424	2.66668	24.7450	27.4117	5.29916	49.1724	54.4715	2.5673E 04	4.1333E 04	7800
8000	9.7841	2.67071	24.8126	27.4833	5.30715	49.3066	54.6138	2.6326E 04	4.2457E 04	8000
8200	9.8260	2.67465	24.8785	27.5532	5.31497	49.4378	54.7528	2.6968E 04	4.3589E 04	8200
8400	9.8679	2.67852	24.9430	27.6216	5.32265	49.5660	54.8884	2.7601E 04	4.4710E 04	8400
8600	9.9098	2.68232	25.0061	27.6884	5.33021	49.6915	55.0215	2.8224E 04	4.5840E 04	8600
8800	9.9519	2.68600	25.0678	27.7539	5.33768	49.8139	55.1516	2.8835E 04	4.6972E 04	8800
9000	9.9940	2.68961	25.1282	27.8180	5.34509	49.9340	55.2790	2.9421E 04	4.8104E 04	9000
9200	10.0362	2.69355	25.1874	27.8809	5.35245	50.0515	55.4040	3.0001E 04	4.9243E 04	9200
9400	10.0785	2.69726	25.2454	27.9428	5.35969	50.1667	55.5264	3.0566E 04	5.0383E 04	9400
9600	10.1208	2.70101	25.3022	28.0032	5.36674	50.2796	55.6470	3.1127E 04	5.1527E 04	9600
9800	10.1632	2.70481	25.3579	28.0627	5.37360	50.3904	55.7653	3.1680E 04	5.2674E 04	9800

TABLE 3 (CONT.-1). IDEAL GAS FUNCTIONS FOR C

TEMP. (°F)	PARTIAL PRESS.	$\frac{h^* - h}{RT}$	$\ln \frac{h^*}{h}$	$\ln \frac{h^* - h}{RT}$	$-\ln \frac{h^* - h}{RT}$	$\frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT}$	TEMP. (°F)
10000	10.2058	2.70647	25.4126	5.34258	50.4990	59.0816	3.39545	0.4	5.38345	0.4	10000
10500	10.3127	2.71073	25.5450	5.40234	50.7621	59.1647	3.39622	0.4	5.38422	0.4	10500
11000	10.4207	2.71460	25.6717	5.45817	51.0140	59.2401	3.39698	0.4	5.38498	0.4	11000
11500	10.5294	2.71840	25.7933	5.50821	51.2536	59.3166	3.39774	0.4	5.38574	0.4	11500
12000	10.6422	2.72201	25.9103	5.56046	51.4800	59.3947	3.39850	0.4	5.38650	0.4	12000
12500	10.7597	2.72551	26.0230	5.61497	51.7121	59.4732	3.39926	0.4	5.38726	0.4	12500
13000	10.8748	2.72897	26.1320	5.67166	51.9406	59.5531	3.40002	0.4	5.38802	0.4	13000
13500	10.9972	2.73240	26.2376	5.73061	52.1657	59.6344	3.40078	0.4	5.38878	0.4	13500
14000	11.1247	2.73579	26.3400	5.79182	52.3874	59.7171	3.40154	0.4	5.38954	0.4	14000
14500	11.2581	2.73915	26.4396	5.85535	52.6058	59.8012	3.40230	0.4	5.39030	0.4	14500
15000	11.3964	2.74248	26.5368	5.92120	52.8210	59.8867	3.40306	0.4	5.39106	0.4	15000
15500	11.5403	2.74578	26.6317	5.98936	53.0340	59.9736	3.40382	0.4	5.39182	0.4	15500
16000	11.6898	2.74905	26.7245	6.05983	53.2449	60.0619	3.40458	0.4	5.39258	0.4	16000
16500	11.8448	2.75229	26.8155	6.13261	53.4537	60.1516	3.40534	0.4	5.39334	0.4	16500
17000	12.0048	2.75551	26.9049	6.20770	53.6604	60.2427	3.40610	0.4	5.39410	0.4	17000
17500	12.1700	2.75870	27.0027	6.28510	53.8650	60.3352	3.40686	0.4	5.39486	0.4	17500
18000	12.3412	2.76187	27.0993	6.36481	54.0675	60.4291	3.40762	0.4	5.39562	0.4	18000
18500	12.5182	2.76502	27.1947	6.44683	54.2689	60.5244	3.40838	0.4	5.39638	0.4	18500
19000	12.6000	2.76815	27.2890	6.53116	54.4692	60.6211	3.40914	0.4	5.39714	0.4	19000
19500	12.7872	2.77126	27.3824	6.61781	54.6684	60.7192	3.40990	0.4	5.39790	0.4	19500
20000	12.9842	2.77435	27.4749	6.70678	54.8665	60.8187	3.41066	0.4	5.39866	0.4	20000
20500	13.1910	2.77742	27.5665	6.79807	55.0635	60.9196	3.41142	0.4	5.39942	0.4	20500
21000	13.4078	2.78047	27.6572	6.89168	55.2594	61.0219	3.41218	0.4	5.40018	0.4	21000
21500	13.6348	2.78351	27.7471	6.98761	55.4542	61.1256	3.41294	0.4	5.40094	0.4	21500
22000	13.8720	2.78653	27.8362	7.08586	55.6479	61.2307	3.41370	0.4	5.40170	0.4	22000
22500	14.1194	2.78954	27.9245	7.18644	55.8405	61.3372	3.41446	0.4	5.40246	0.4	22500
23000	14.3770	2.79253	28.0121	7.28935	56.0320	61.4451	3.41522	0.4	5.40322	0.4	23000
23500	14.6448	2.79550	28.0990	7.39459	56.2224	61.5544	3.41598	0.4	5.40398	0.4	23500
24000	14.9228	2.79845	28.1852	7.50206	56.4117	61.6651	3.41674	0.4	5.40474	0.4	24000
24500	15.2110	2.80138	28.2707	7.61175	56.6000	61.7772	3.41750	0.4	5.40550	0.4	24500
25000	15.5094	2.80429	28.3556	7.72366	56.7872	61.8907	3.41826	0.4	5.40626	0.4	25000
25500	15.8180	2.80718	28.4400	7.83779	56.9733	62.0056	3.41902	0.4	5.40702	0.4	25500
26000	16.1368	2.81005	28.5239	7.95414	57.1584	62.1219	3.41978	0.4	5.40778	0.4	26000
26500	16.4658	2.81290	28.6074	8.07271	57.3425	62.2396	3.42054	0.4	5.40854	0.4	26500
27000	16.8050	2.81573	28.6904	8.19350	57.5256	62.3587	3.42130	0.4	5.40930	0.4	27000
27500	17.1544	2.81854	28.7729	8.31651	57.7077	62.4792	3.42206	0.4	5.41006	0.4	27500
28000	17.5140	2.82133	28.8549	8.44174	57.8888	62.6011	3.42282	0.4	5.41082	0.4	28000
28500	17.8838	2.82410	28.9364	8.56919	58.0689	62.7244	3.42358	0.4	5.41158	0.4	28500
29000	18.2638	2.82685	29.0174	8.69886	58.2480	62.8491	3.42434	0.4	5.41234	0.4	29000
29500	18.6540	2.82958	29.0979	8.83075	58.4261	62.9752	3.42510	0.4	5.41310	0.4	29500
30000	19.0544	2.83229	29.1779	8.96486	58.6032	63.1027	3.42586	0.4	5.41386	0.4	30000
30500	19.4650	2.83498	29.2574	9.10119	58.7793	63.2316	3.42662	0.4	5.41462	0.4	30500
31000	19.8858	2.83765	29.3364	9.23974	58.9544	63.3619	3.42738	0.4	5.41538	0.4	31000
31500	20.3168	2.84030	29.4149	9.38051	59.1285	63.4936	3.42814	0.4	5.41614	0.4	31500
32000	20.7580	2.84293	29.4929	9.52350	59.3016	63.6267	3.42890	0.4	5.41690	0.4	32000
32500	21.2094	2.84554	29.5704	9.66871	59.4737	63.7612	3.42966	0.4	5.41766	0.4	32500
33000	21.6710	2.84813	29.6474	9.81614	59.6448	63.8971	3.43042	0.4	5.41842	0.4	33000
33500	22.1428	2.85070	29.7239	9.96579	59.8149	64.0344	3.43118	0.4	5.41918	0.4	33500
34000	22.6248	2.85325	29.7999	10.11766	59.9840	64.1731	3.43194	0.4	5.41994	0.4	34000
34500	23.1170	2.85578	29.8754	10.27175	60.1521	64.3132	3.43270	0.4	5.42070	0.4	34500
35000	23.6194	2.85829	29.9504	10.42806	60.3192	64.4547	3.43346	0.4	5.42146	0.4	35000
35500	24.1320	2.86078	30.0249	10.58659	60.4853	64.5976	3.43422	0.4	5.42222	0.4	35500
36000	24.6548	2.86325	30.0989	10.74734	60.6504	64.7419	3.43498	0.4	5.42298	0.4	36000
36500	25.1878	2.86570	30.1724	10.91031	60.8145	64.8876	3.43574	0.4	5.42374	0.4	36500
37000	25.7309	2.86813	30.2454	11.07550	60.9776	65.0347	3.43650	0.4	5.42450	0.4	37000
37500	26.2841	2.87054	30.3179	11.24291	61.1397	65.1832	3.43726	0.4	5.42526	0.4	37500
38000	26.8474	2.87293	30.3899	11.41254	61.3008	65.3341	3.43802	0.4	5.42602	0.4	38000
38500	27.4208	2.87530	30.4614	11.58439	61.4609	65.4864	3.43878	0.4	5.42678	0.4	38500
39000	27.9943	2.87765	30.5324	11.75846	61.6199	65.6401	3.43954	0.4	5.42754	0.4	39000
39500	28.5778	2.87998	30.6029	11.93475	61.7779	65.7952	3.44030	0.4	5.42830	0.4	39500
40000	29.1713	2.88229	30.6729	12.11326	61.9349	65.9517	3.44106	0.4	5.42906	0.4	40000
40500	29.7748	2.88458	30.7424	12.29399	62.0909	66.1096	3.44182	0.4	5.42982	0.4	40500
41000	30.3883	2.88685	30.8114	12.47694	62.2459	66.2689	3.44258	0.4	5.43058	0.4	41000
41500	30.9998	2.88910	30.8800	12.66211	62.4000	66.4296	3.44334	0.4	5.43134	0.4	41500
42000	31.6193	2.89133	30.9481	12.84950	62.5531	66.5917	3.44410	0.4	5.43210	0.4	42000
42500	32.2468	2.89354	31.0157	13.03911	62.7052	66.7552	3.44486	0.4	5.43286	0.4	42500
43000	32.8813	2.89573	31.0828	13.23094	62.8563	66.9192	3.44562	0.4	5.43362	0.4	43000
43500	33.5228	2.89790	31.1494	13.42500	63.0064	67.0847	3.44638	0.4	5.43438	0.4	43500
44000	34.1713	2.89995	31.2156	13.62129	63.1565	67.2517	3.44714	0.4	5.43514	0.4	44000
44500	34.8268	2.90200	31.2813	13.81981	63.3066	67.4192	3.44790	0.4	5.43590	0.4	44500
45000	35.4893	2.90403	31.3465	14.02056	63.4567	67.5882	3.44866	0.4	5.43666	0.4	45000
45500	36.1588	2.90605	31.4112	14.22354	63.6068	67.7587	3.44942	0.4	5.43742	0.4	45500
46000	36.8353	2.90806	31.4754	14.42875	63.7569	67.9307	3.45018	0.4	5.43818	0.4	46000
46500	37.5188	2.91006	31.5391	14.63619	63.9070	68.1042	3.45094	0.4	5.43894	0.4	46500
47000	38.2093	2.91205	31.6023	14.84586	64.0571	68.2792	3.45170	0.4	5.43970	0.4	47000
47500	38.9068	2.91403	31.6650	15.05776	64.2072	68.4557	3.45246	0.4	5.44046	0.4	47500
48000	39.6113	2.91600	31.7272	15.27189	64.3573	68.6327	3.45322	0.4	5.44122	0.4	48000
48500	40.3228	2.91796	31.7889	15.48824	64.5074	68.8102	3.45398	0.4	5.44198	0.4	48500
49000	41.0413	2.91991	31.8501	15.70681	64.6575	68.9892	3.45474	0.4	5.44274	0.4	49000
49500	41.7668	2.92185	31.9108	15.92750	64.8076	69.1697	3.45550	0.4	5.44350	0.4	49500
50000	42.4993	2.92378	31.9710	16.15031	64.9577	69.3517	3.45626	0.4	5.44426	0.4	50000

TABLE 4. IDEAL GAS FUNCTIONS FOR N (ATOMIC WEIGHT 14.0067, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 4B FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I}$	TEMP. (°K)		
1000	4.0000	2.50000	18.9500	21.4500	4.96791	37.6548	42.6248	2.9007E 03	4.9679E 03	3.7657E 04	1000
1200	4.0000	2.50000	19.4000	21.9000	4.96791	38.1048	43.0748	2.9007E 03	4.9679E 03	3.7657E 04	1200
1400	4.0000	2.50000	19.7412	22.2412	4.96791	38.5548	43.5248	2.9007E 03	4.9679E 03	3.7657E 04	1400
1600	4.0000	2.50000	20.1250	22.6250	4.96791	38.9991	43.9691	2.9007E 03	4.9679E 03	3.7657E 04	1600
1800	4.0000	2.50001	20.4195	22.9195	4.96793	40.5749	45.5448	2.9007E 03	4.9679E 03	3.7657E 04	1800
2000	4.0000	2.50003	20.6829	23.1829	4.96794	41.1003	46.0693	2.9007E 03	4.9679E 03	3.7657E 04	2000
2200	4.0000	2.50011	20.9212	23.4212	4.96813	41.3736	46.3420	2.9007E 03	4.9681E 03	3.7657E 04	2200
2400	4.0001	2.50028	21.1387	23.6387	4.96848	42.0081	47.0746	2.9007E 03	4.9684E 03	3.7657E 04	2400
2600	4.0002	2.50046	21.3309	23.8309	4.96918	42.4039	47.4726	2.9007E 03	4.9691E 03	3.7657E 04	2600
2800	4.0005	2.50127	21.5242	24.0255	4.97044	42.7722	47.8426	2.9007E 03	4.9704E 03	3.7657E 04	2800
3000	4.0018	2.50230	21.6968	24.1981	4.97248	43.1151	48.0876	2.9007E 03	4.9724E 03	3.7657E 04	3000
3200	4.0030	2.50355	21.8504	24.3517	4.97556	43.3362	48.2117	2.9007E 03	4.9755E 03	3.7657E 04	3200
3400	4.0047	2.50509	22.0102	24.5115	4.97991	43.7379	48.7176	2.9007E 03	4.9799E 03	3.7657E 04	3400
3600	4.0070	2.51201	22.1935	24.6948	4.98579	44.0227	49.0085	2.9007E 03	4.9857E 03	3.7657E 04	3600
3800	4.0101	2.51799	22.4183	24.9199	4.99338	44.2925	49.2859	2.9007E 03	4.9933E 03	3.7657E 04	3800
4000	4.0181	2.52337	22.6413	25.1429	5.00286	44.5468	49.5517	2.9007E 03	5.0011E 03	3.7657E 04	4000
4200	4.0260	2.52822	22.8548	25.3564	5.01436	44.7932	49.8074	2.9007E 03	5.0143E 03	3.7657E 04	4200
4400	4.0346	2.53314	23.0574	25.5590	5.02794	45.0306	50.0547	2.9007E 03	5.0279E 03	3.7657E 04	4400
4600	4.0432	2.53816	23.2497	25.7513	5.04360	45.2601	50.2943	2.9007E 03	5.0436E 03	3.7657E 04	4600
4800	4.0525	2.54329	23.4316	25.9332	5.06159	45.4827	50.5173	2.9007E 03	5.0615E 03	3.7657E 04	4800
5000	4.0618	2.54859	23.6033	26.1049	5.08199	45.6977	50.7343	2.9007E 03	5.0819E 03	3.7657E 04	5000
5200	4.0718	2.55403	23.7656	26.2672	5.10482	45.9055	50.9450	2.9007E 03	5.1048E 03	3.7657E 04	5200
5400	4.0823	2.55952	23.9181	26.4197	5.12998	46.1065	51.1490	2.9007E 03	5.1299E 03	3.7657E 04	5400
5600	4.0935	2.56513	24.0614	26.5620	5.15736	46.2924	51.3465	2.9007E 03	5.1573E 03	3.7657E 04	5600
5800	4.1054	2.57171	24.1954	26.6960	5.18698	46.4657	51.5377	2.9007E 03	5.1869E 03	3.7657E 04	5800
6000	4.1182	2.57826	24.3206	26.8212	5.21886	46.6280	51.7222	2.9007E 03	5.2188E 03	3.7657E 04	6000
6200	4.1318	2.58479	24.4374	26.9380	5.25299	46.7801	51.9000	2.9007E 03	5.2529E 03	3.7657E 04	6200
6400	4.1461	2.59129	24.5456	27.0462	5.28936	46.9224	52.0711	2.9007E 03	5.2893E 03	3.7657E 04	6400
6600	4.1611	2.59776	24.6451	27.1457	5.32799	47.0557	52.2355	2.9007E 03	5.3279E 03	3.7657E 04	6600
6800	4.1768	2.60419	24.7361	27.2367	5.36886	47.1824	52.3944	2.9007E 03	5.3688E 03	3.7657E 04	6800
7000	4.1932	2.61059	24.8185	27.3191	5.41198	47.3024	52.5480	2.9007E 03	5.4119E 03	3.7657E 04	7000
7200	4.2103	2.61695	24.8924	27.3930	5.45736	47.4157	52.6973	2.9007E 03	5.4573E 03	3.7657E 04	7200
7400	4.2280	2.62326	24.9579	27.4585	5.50500	47.5224	52.8426	2.9007E 03	5.5050E 03	3.7657E 04	7400
7600	4.2463	2.62952	25.0149	27.5155	5.55499	47.6234	52.9840	2.9007E 03	5.5549E 03	3.7657E 04	7600
7800	4.2651	2.63574	25.0634	27.5640	5.60733	47.7187	53.1215	2.9007E 03	5.6073E 03	3.7657E 04	7800
8000	4.2844	2.64192	25.1034	27.6040	5.66202	47.8087	53.2555	2.9007E 03	5.6620E 03	3.7657E 04	8000
8200	4.3042	2.64806	25.1359	27.6355	5.71906	47.8934	53.3855	2.9007E 03	5.7190E 03	3.7657E 04	8200
8400	4.3245	2.65416	25.1609	27.6585	5.77846	47.9734	53.5115	2.9007E 03	5.7784E 03	3.7657E 04	8400
8600	4.3453	2.66021	25.1784	27.6730	5.84022	48.0487	53.6335	2.9007E 03	5.8402E 03	3.7657E 04	8600
8800	4.3666	2.66621	25.1884	27.6790	5.90446	48.1199	53.7515	2.9007E 03	5.9044E 03	3.7657E 04	8800
9000	4.3884	2.67216	25.1909	27.6765	5.97119	48.1874	53.8655	2.9007E 03	5.9711E 03	3.7657E 04	9000
9200	4.4107	2.67806	25.1859	27.6655	6.04052	48.2514	53.9755	2.9007E 03	6.0405E 03	3.7657E 04	9200
9400	4.4336	2.68391	25.1734	27.6460	6.11256	48.3119	54.0815	2.9007E 03	6.1125E 03	3.7657E 04	9400
9600	4.4569	2.68971	25.1534	27.6180	6.18730	48.3604	54.1835	2.9007E 03	6.1873E 03	3.7657E 04	9600
9800	4.4806	2.69546	25.1259	27.5825	6.26474	48.4019	54.2815	2.9007E 03	6.2647E 03	3.7657E 04	9800
10000	4.5048	2.70116	25.0909	27.5395	6.34488	48.4364	54.3755	2.9007E 03	6.3448E 03	3.7657E 04	10000

TABLE 4 (CONT.). IDEAL GAS FUNCTIONS FOR H

TEMP. (°F.)	PARTIT. FUNCT.	$\frac{h^0 - h^0}{RT}$	$\ln \frac{h^0 - h^0}{RT}$	$\ln \frac{h^0 - h^0}{RT}$	$\ln \frac{h^0 - h^0}{RT}$	$\ln \frac{h^0 - h^0}{RT}$	$\ln \frac{h^0 - h^0}{RT}$	$\ln \frac{h^0 - h^0}{RT}$	$\ln \frac{h^0 - h^0}{RT}$	TEMP. (°F.)
10000	4.7237	2.95220	24.8728	27.8250	5.04650	49.4201	55.2909	3.87938	0.0000	10000
10500	4.8332	2.96676	25.0177	28.0044	5.09519	49.7153	55.4495	4.14542	0.0000	10500
11000	4.9476	3.01867	25.1574	28.1761	5.19901	49.9919	55.7995	4.41266	0.0000	11000
11500	5.0663	3.08404	25.2922	28.3403	5.34003	50.2568	56.2368	4.68038	0.0000	11500
12000	5.1889	3.17506	25.4225	28.4976	5.51066	50.5150	56.6594	4.94828	0.0000	12000
12500	5.3149	3.28004	25.5466	28.6466	5.71029	50.7692	57.0675	5.21642	0.0000	12500
13000	5.4439	3.40332	25.6704	28.7939	5.94056	51.0117	57.4618	5.48492	0.0000	13000
13500	5.5758	3.54530	25.7889	28.9342	6.20264	51.2468	57.8478	5.75312	0.0000	13500
14000	5.7104	3.70640	25.9037	29.0701	6.49816	51.4749	58.2266	6.02092	0.0000	14000
14500	5.8476	3.88704	26.0151	29.2022	6.82316	51.6964	58.5996	6.28832	0.0000	14500
15000	5.9875	4.08764	26.1235	29.3312	7.17815	51.9118	58.9666	6.55532	0.0000	15000
15500	6.1301	4.30867	26.2291	29.4577	7.56315	52.1215	59.3276	6.82192	0.0000	15500
16000	6.2758	4.55067	26.3319	29.5824	7.97815	52.3258	59.6832	7.08812	0.0000	16000
16500	6.4246	4.81364	26.4323	29.7057	8.42315	52.5253	60.0342	7.35392	0.0000	16500
17000	6.5770	5.09764	26.5304	29.8282	8.89815	52.7202	60.3802	7.61932	0.0000	17000
17500	6.7334	5.40364	26.6263	29.9495	9.40315	52.9109	60.7215	7.88432	0.0000	17500
18000	6.8943	5.73264	26.7204	30.0728	9.93815	53.0978	61.0588	8.14892	0.0000	18000
18500	7.0601	6.08564	26.8126	30.1954	10.50315	53.2811	61.3921	8.41312	0.0000	18500
19000	7.2315	6.45964	26.9033	30.3192	11.09815	53.4613	61.7215	8.67692	0.0000	19000
19500	7.4089	6.85564	27.0025	30.4430	11.72315	53.6385	62.0469	8.94032	0.0000	19500
20000	7.5932	7.27364	27.1003	30.5667	12.37815	53.8131	62.3681	9.20332	0.0000	20000
20500	7.7846	7.71864	27.1970	30.6897	13.06315	53.9851	62.6851	9.46592	0.0000	20500
21000	7.9829	8.18064	27.2927	30.8123	13.77815	54.1551	63.0001	9.72812	0.0000	21000
21500	8.1881	8.66864	27.3874	30.9349	14.52315	54.3231	63.3121	9.98992	0.0000	21500
22000	8.3999	9.18264	27.4811	31.0575	15.29815	54.4891	63.6221	10.25132	0.0000	22000
22500	8.6181	9.72264	27.5738	31.1791	16.10315	54.6531	63.9291	10.51232	0.0000	22500
23000	8.8429	10.28864	27.6655	31.3007	16.93815	54.8151	64.2331	10.77292	0.0000	23000
23500	9.0749	10.88064	27.7562	31.4223	17.80315	54.9761	64.5351	11.03312	0.0000	23500
24000	9.3139	11.49864	27.8459	31.5439	18.69815	55.1351	64.8351	11.29292	0.0000	24000
24500	9.5599	12.14264	27.9346	31.6655	19.62315	55.2931	65.1331	11.55232	0.0000	24500
25000	9.8129	12.81264	28.0223	31.7871	20.57815	55.4491	65.4291	11.81132	0.0000	25000
25500	10.0729	13.50864	28.1090	31.9087	21.56315	55.6031	65.7231	12.06992	0.0000	25500
26000	10.3399	14.23064	28.1947	32.0293	22.57815	55.7551	66.0151	12.32812	0.0000	26000
26500	10.6139	14.97864	28.2794	32.1499	23.62315	55.9051	66.3051	12.58592	0.0000	26500
27000	10.8949	15.75264	28.3631	32.2695	24.69815	56.0531	66.5931	12.84332	0.0000	27000
27500	11.1829	16.55264	28.4458	32.3881	25.80015	56.2001	66.8791	13.09932	0.0000	27500
28000	11.4779	17.37864	28.5275	32.5057	26.93215	56.3451	67.1631	13.35392	0.0000	28000
28500	11.7799	18.23064	28.6082	32.6223	28.09415	56.4881	67.4451	13.60712	0.0000	28500
29000	12.0889	19.10864	28.6879	32.7379	29.28615	56.6291	67.7251	13.85892	0.0000	29000
29500	12.4049	20.01264	28.7666	32.8525	30.50815	56.7681	68.0031	14.10932	0.0000	29500
30000	12.7279	20.94264	28.8443	32.9661	31.76015	56.9051	68.2791	14.35832	0.0000	30000
30500	13.0579	21.89864	28.9210	33.0787	33.04215	57.0401	68.5531	14.60592	0.0000	30500
31000	13.3949	22.88064	29.0000	33.1913	34.35415	57.1731	68.8251	14.85212	0.0000	31000
31500	13.7389	23.88864	29.0767	33.3039	35.69615	57.3041	69.0951	15.09692	0.0000	31500
32000	14.0899	24.92264	29.1524	33.4165	37.06815	57.4331	69.3631	15.34032	0.0000	32000
32500	14.4479	25.98264	29.2271	33.5281	38.47015	57.5601	69.6291	15.58232	0.0000	32500
33000	14.8129	27.06864	29.3008	33.6397	39.90215	57.6851	69.8931	15.82292	0.0000	33000
33500	15.1849	28.18064	29.3735	33.7513	41.36415	57.8081	70.1551	16.06212	0.0000	33500
34000	15.5629	29.31864	29.4452	33.8629	42.85615	57.9291	70.4151	16.30012	0.0000	34000
34500	15.9469	30.48264	29.5159	33.9745	44.37815	58.0481	70.6731	16.53692	0.0000	34500
35000	16.3369	31.67264	29.5856	34.0861	45.93015	58.1651	70.9291	16.77252	0.0000	35000
35500	16.7329	32.88864	29.6543	34.1977	47.51215	58.2801	71.1831	17.00692	0.0000	35500
36000	17.1349	34.13064	29.7220	34.3093	49.12415	58.3931	71.4351	17.24012	0.0000	36000
36500	17.5429	35.39864	29.7887	34.4209	50.76615	58.5041	71.6851	17.47212	0.0000	36500
37000	17.9569	36.69264	29.8544	34.5325	52.43815	58.6131	71.9331	17.70292	0.0000	37000
37500	18.3769	37.99264	29.9191	34.6441	54.14015	58.7201	72.1791	17.93252	0.0000	37500
38000	18.8029	39.30864	29.9828	34.7557	55.87215	58.8251	72.4231	18.16092	0.0000	38000
38500	19.2349	40.64064	30.0455	34.8673	57.63415	58.9281	72.6651	18.38812	0.0000	38500
39000	19.6729	41.98864	30.1072	34.9789	59.42615	59.0291	72.9051	18.61412	0.0000	39000
39500	20.1169	43.35264	30.1679	35.0905	61.24815	59.1281	73.1431	18.83892	0.0000	39500
40000	20.5669	44.73264	30.2276	35.2021	63.09015	59.2251	73.3791	19.06252	0.0000	40000
40500	21.0229	46.12864	30.2863	35.3137	64.96215	59.3201	73.6131	19.28492	0.0000	40500
41000	21.4849	47.54064	30.3440	35.4253	66.86415	59.4131	73.8451	19.50612	0.0000	41000
41500	21.9529	48.96864	30.4007	35.5369	68.79615	59.5041	74.0751	19.72612	0.0000	41500
42000	22.4269	50.41264	30.4564	35.6485	70.75815	59.5931	74.3031	19.94492	0.0000	42000
42500	22.9069	51.87264	30.5111	35.7601	72.75015	59.6801	74.5291	20.16252	0.0000	42500
43000	23.3929	53.34864	30.5648	35.8717	74.77215	59.7651	74.7531	20.37892	0.0000	43000
43500	23.8849	54.84064	30.6175	35.9833	76.82415	59.8481	74.9751	20.59412	0.0000	43500
44000	24.3829	56.34864	30.6692	36.0949	78.89615	59.9291	75.1951	20.80812	0.0000	44000
44500	24.8869	57.87264	30.7209	36.2065	80.98815	60.0081	75.4131	21.02092	0.0000	44500
45000	25.3969	59.41264	30.7716	36.3181	83.10015	60.0851	75.6291	21.23252	0.0000	45000
45500	25.9129	60.96864	30.8213	36.4297	85.23215	60.1601	75.8431	21.44292	0.0000	45500
46000	26.4349	62.54064	30.8810	36.5413	87.38415	60.2331	76.0551	21.65212	0.0000	46000
46500	26.9629	64.12864	30.9397	36.6529	89.55615	60.3041	76.2651	21.85992	0.0000	46500
47000	27.4969	65.73264	31.0000	36.7645	91.74815	60.3731	76.4731	22.06632	0.0000	47000
47500	28.0369	67.35264	31.0597	36.8761	93.96015	60.4401	76.6791	22.27132	0.0000	47500
48000	28.5829	68.98864	31.1184	36.9877	96.19215	60.5051	76.8831	22.47492	0.0000	48000
48500	29.1349	70.64064	31.1761	37.0993	98.44415	60.5681	77.0851	22.67712	0.0000	48500
49000	29.6929	72.30864	31.2328	37.2109	100.71615	60.6291	77.2851	22.87792	0.0000	49000
49500	30.2569	73.99264	31.2885	37.3225	103.00815	60.6881	77.4831	23.07732	0.0000	49500
50000	30.8269	75.69264	31.3432	37.4341	105.32015	60.7451	77.6791	23.27532	0.0000	50000

TABLE 5. IDEAL GAS FUNCTIONS FOR O (ATOMIC WEIGHT 15.9994, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 49 FOR LIST OF STATES USED.

TEMP. (°K)	PARITY. FUNCT.	$\frac{W^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	$\frac{E^2 - E^2}{RT}$	TEMP. (°K)
1000	0.1105	2.59413	19.8544	22.4525	5.15893	19.4560	44.6169	3.1718E 03	5.1589E 03	1000
1200	0.2435	2.58227	20.3285	22.9107	5.13140	40.3960	45.5274	3.7731E 03	4.1577E 03	1200
1400	0.3416	2.57186	20.7257	23.2976	5.11071	41.1894	46.2961	4.3730E 03	4.7156E 03	1400
1600	0.4174	2.56377	21.0486	23.6323	5.09463	41.8667	46.9614	4.9720E 03	5.3154E 03	1600
1800	0.4774	2.55732	21.3702	23.9275	5.08182	42.4660	47.5679	5.5704E 03	5.9167E 03	1800
2000	0.5244	2.55209	21.6393	24.1914	5.07142	43.0009	48.1023	6.1684E 03	6.5180E 03	2000
2200	0.5673	2.54780	21.8823	24.4302	5.06240	43.4938	48.5956	6.7664E 03	7.1193E 03	2200
2400	0.6016	2.54431	22.1039	24.6482	5.05464	43.9451	49.0469	7.3644E 03	7.7206E 03	2400
2600	0.6312	2.54150	22.3074	24.8489	5.04839	44.3285	49.3709	7.9624E 03	8.3220E 03	2600
2800	0.6571	2.53932	22.4957	25.0350	5.04405	44.7026	49.7487	8.5604E 03	8.9234E 03	2800
3000	0.6801	2.53773	22.6708	25.2086	5.04120	45.0507	50.0956	9.1584E 03	9.5248E 03	3000
3200	0.7009	2.53671	22.8346	25.3713	5.03966	45.3761	50.4169	9.7564E 03	1.0131E 04	3200
3400	0.7202	2.53622	22.9885	25.5246	5.03906	45.6816	50.7215	1.0379E 04	1.0713E 04	3400
3600	0.7382	2.53626	23.1333	25.6696	5.03906	45.9697	51.0097	1.0599E 04	1.1295E 04	3600
3800	0.7555	2.53678	23.2704	25.8072	5.04101	46.2422	51.2832	1.1005E 04	1.1877E 04	3800
4000	0.7722	2.53778	23.4006	25.9384	5.04290	46.5000	51.5438	1.2223E 04	2.0172E 04	4000
4200	0.7887	2.53920	23.5244	26.0636	5.04501	46.7469	51.7928	1.2944E 04	2.1192E 04	4200
4400	0.8051	2.54103	23.6426	26.1836	5.04744	46.9818	52.0312	1.3674E 04	2.2210E 04	4400
4600	0.8216	2.54321	23.7556	26.2988	5.05037	47.2063	52.2601	1.4404E 04	2.3247E 04	4600
4800	0.8383	2.54572	23.8639	26.4096	5.05377	47.4215	52.4803	1.5134E 04	2.4285E 04	4800
5000	0.8553	2.54852	23.9679	26.5164	5.05764	47.6281	52.6925	1.5864E 04	2.5323E 04	5000
5200	0.8727	2.55154	24.0679	26.6195	5.06200	47.8269	52.8973	1.6594E 04	2.6361E 04	5200
5400	0.8905	2.55484	24.1642	26.7191	5.06689	48.0183	53.0952	1.7324E 04	2.7400E 04	5400
5600	0.9088	2.55829	24.2572	26.8154	5.07235	48.2031	53.2869	1.8054E 04	2.8439E 04	5600
5800	0.9276	2.56189	24.3471	26.9089	5.07840	48.3816	53.4725	1.8784E 04	2.9478E 04	5800
6000	0.9469	2.56561	24.4340	27.0000	5.08500	48.5543	53.6526	1.9514E 04	3.0517E 04	6000
6200	0.9667	2.56943	24.5182	27.0876	5.09216	48.7214	53.8275	2.0244E 04	3.1556E 04	6200
6400	0.9871	2.57331	24.5998	27.1731	5.10000	48.8839	53.9975	2.0974E 04	3.2595E 04	6400
6600	0.9879	2.57724	24.6790	27.2563	5.10841	49.0413	54.1627	2.1704E 04	3.3634E 04	6600
6800	0.9292	2.58120	24.7560	27.3372	5.11726	49.1943	54.3236	2.2434E 04	3.4673E 04	6800
7000	0.9510	2.58516	24.8309	27.4161	5.12654	49.3431	54.4803	2.3164E 04	3.5712E 04	7000
7200	0.9733	2.58911	24.9036	27.4929	5.13626	49.4880	54.6338	2.3894E 04	3.6751E 04	7200
7400	0.9959	2.59304	24.9748	27.5678	5.14642	49.6296	54.7848	2.4624E 04	3.7790E 04	7400
7600	0.1196	2.59694	25.0440	27.6409	5.15704	49.7686	54.9331	2.5354E 04	3.8829E 04	7600
7800	0.1425	2.60079	25.1115	27.7123	5.16814	49.9057	55.0800	2.6084E 04	3.9868E 04	7800
8000	0.1662	2.60458	25.1774	27.7820	5.17967	50.0416	55.2274	2.6814E 04	4.0907E 04	8000
8200	0.1904	2.60831	25.2418	27.8501	5.19163	50.1769	55.3747	2.7544E 04	4.1946E 04	8200
8400	0.2148	2.61198	25.3044	27.9164	5.20402	50.3116	55.5219	2.8274E 04	4.2985E 04	8400
8600	0.2395	2.61557	25.3662	27.9817	5.21684	50.4459	55.6691	2.9004E 04	4.4024E 04	8600
8800	0.2645	2.61909	25.4263	28.0454	5.23019	50.5798	55.8163	2.9734E 04	4.5063E 04	8800
9000	0.2896	2.62252	25.4852	28.1077	5.24400	50.7133	55.9635	3.0464E 04	4.6102E 04	9000
9200	0.3150	2.62588	25.5429	28.1688	5.25826	50.8464	56.1107	3.1194E 04	4.7141E 04	9200
9400	0.3406	2.62916	25.5994	28.2286	5.27297	50.9791	56.2579	3.1926E 04	4.8180E 04	9400
9600	0.3664	2.63236	25.6547	28.2871	5.28812	51.1116	56.4052	3.2658E 04	4.9219E 04	9600
9800	0.3923	2.63547	25.7091	28.3446	5.30372	51.2439	56.5525	3.3390E 04	5.0258E 04	9800

TABLE 5 (CONT.). IDEAL GAS FUNCTIONS FOR O

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{2\pi m}$	$\ln \frac{h^2}{2\pi m}$	$\ln \frac{h^2}{2\pi m} - \frac{h^2}{2\pi m}$	$\ln \frac{h^2}{2\pi m} - \frac{h^2}{2\pi m}$	$\ln \frac{h^2}{2\pi m} - \frac{h^2}{2\pi m}$	$\ln \frac{h^2}{2\pi m} - \frac{h^2}{2\pi m}$	$\ln \frac{h^2}{2\pi m} - \frac{h^2}{2\pi m}$	TEMP. (°K)
10000	9.4183	2.43052	24.7624	24.3117	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
10000	9.4039	2.43502	25.0913	24.7624	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
10000	9.3895	2.43952	25.4202	25.0913	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
11000	9.3499	2.45273	26.0145	25.4202	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
11000	9.3355	2.45723	26.3434	26.0145	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
12000	9.2959	2.47044	26.9377	26.3434	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
12000	9.2815	2.47494	27.2666	26.9377	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
13000	9.2419	2.48815	27.8609	27.2666	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
13000	9.2275	2.49265	28.1898	27.8609	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
14000	9.1879	2.50586	28.7841	28.1898	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
14000	9.1735	2.51036	29.1130	28.7841	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
15000	9.1339	2.52357	29.7073	29.1130	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
15000	9.1195	2.52807	30.0362	29.7073	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
16000	9.0799	2.54128	30.6305	30.0362	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
16000	9.0655	2.54578	30.9594	30.6305	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
17000	9.0259	2.55899	31.5537	30.9594	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
17000	9.0115	2.56349	31.8826	31.5537	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
18000	8.9719	2.57670	32.4769	31.8826	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
18000	8.9575	2.58120	32.8058	32.4769	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
19000	8.9179	2.59441	33.4001	32.8058	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
19000	8.9035	2.59891	33.7290	33.4001	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
20000	8.8639	2.61212	34.3233	33.7290	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
20000	8.8495	2.61662	34.6522	34.3233	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
21000	8.8099	2.62983	35.2465	34.6522	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
21000	8.7955	2.63433	35.5754	35.2465	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
22000	8.7559	2.64754	36.1697	35.5754	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
22000	8.7415	2.65204	36.4986	36.1697	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
23000	8.7019	2.66525	37.0929	36.4986	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
23000	8.6875	2.66975	37.4218	37.0929	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
24000	8.6479	2.68296	38.0161	37.4218	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
24000	8.6335	2.68746	38.3450	38.0161	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
25000	8.5939	2.70067	38.9393	38.3450	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
25000	8.5795	2.70517	39.2682	38.9393	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
26000	8.5399	2.71838	39.8625	39.2682	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
26000	8.5255	2.72288	40.1914	39.8625	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
27000	8.4859	2.73609	40.7857	40.1914	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
27000	8.4715	2.74059	41.1146	40.7857	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
28000	8.4319	2.75380	41.7089	41.1146	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
28000	8.4175	2.75830	42.0378	41.7089	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
29000	8.3779	2.77151	42.6321	42.0378	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
29000	8.3635	2.77601	42.9610	42.6321	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
30000	8.3239	2.78922	43.5553	42.9610	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
30000	8.3095	2.79372	43.8842	43.5553	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
31000	8.2699	2.80693	44.4785	43.8842	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
31000	8.2555	2.81143	44.8074	44.4785	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
32000	8.2159	2.82464	45.4017	44.8074	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
32000	8.2015	2.82914	45.7306	45.4017	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
33000	8.1619	2.84235	46.3249	45.7306	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
33000	8.1475	2.84685	46.6538	46.3249	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
34000	8.1079	2.86006	47.2481	46.6538	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
34000	8.0935	2.86456	47.5770	47.2481	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
35000	8.0539	2.87777	48.1713	47.5770	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
35000	8.0395	2.88227	48.5002	48.1713	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
36000	8.0000	2.89548	49.0945	48.5002	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
36000	7.9856	2.89998	49.4234	49.0945	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
37000	7.9459	2.91319	50.0177	49.4234	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
37000	7.9315	2.91769	50.3466	50.0177	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
38000	7.8919	2.93090	50.9409	50.3466	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
38000	7.8775	2.93540	51.2698	50.9409	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
39000	7.8379	2.94861	51.8641	51.2698	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
39000	7.8235	2.95311	52.1930	51.8641	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
40000	7.7839	2.96632	52.7873	52.1930	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
40000	7.7695	2.97082	53.1162	52.7873	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
41000	7.7299	2.98403	53.7105	53.1162	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
41000	7.7155	2.98853	54.0394	53.7105	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
42000	7.6759	2.99974	54.6337	54.0394	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
42000	7.6615	3.00424	54.9626	54.6337	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
43000	7.6219	3.01745	55.5569	54.9626	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
43000	7.6075	3.02195	55.8858	55.5569	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
44000	7.5679	3.03516	56.4801	55.8858	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
44000	7.5535	3.03966	56.8090	56.4801	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
45000	7.5139	3.05287	57.4033	56.8090	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
45000	7.5000	3.05737	57.7322	57.4033	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
46000	7.4603	3.07058	58.3265	57.7322	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
46000	7.4459	3.07508	58.6554	58.3265	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
47000	7.4063	3.08829	59.2497	58.6554	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
47000	7.3919	3.09279	59.5786	59.2497	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
48000	7.3523	3.10600	60.1729	59.5786	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
48000	7.3379	3.11050	60.5018	60.1729	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
49000	7.2983	3.12371	61.0961	60.5018	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
49000	7.2839	3.12821	61.4250	61.0961	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
50000	7.2443	3.14142	62.0193	61.4250	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05
50000	7.2299	3.14592	62.3482	62.0193	91.1941	94.4373	3.2540E 04	9.2432E 04	5.1194E 05

TABLE 4. REDUCED GAS FUNCTIONS FOR AN IDEAL GASEOUS SUBSTANCE 39.9400, $R = 1.98717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 50 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL PRESS.	$\frac{U^*}{RT}$	$\frac{U^*}{RT} - \frac{U^*}{RT}$	\ln	$\ln^2 - \frac{U^*}{RT}$	$\frac{U^*}{RT} - \frac{U^*}{RT}$	$\frac{U^*}{RT} - \frac{U^*}{RT}$	$\frac{U^*}{RT} - \frac{U^*}{RT}$	TEMP. (°K)
1000	1.0000	2.50000	19.1350	21.6350	6.96791	30.0260	42.9939	2.90070	1000
1200	1.0000	2.50000	19.5916	22.0916	6.96791	30.9318	43.0682	3.07960	1200
1400	1.0000	2.50000	19.9770	22.4770	6.96791	31.6976	43.3024	3.27300	1400
1600	1.0000	2.50000	20.3160	22.8160	6.96791	32.3609	43.6391	3.48000	1600
1800	1.0000	2.50000	20.6053	23.1053	6.96791	32.9441	43.9759	3.69900	1800
2000	1.0000	2.50000	20.8487	23.3487	6.96791	33.4695	44.3127	3.93900	2000
2200	1.0000	2.50000	21.1049	23.6049	6.96791	33.9480	44.5912	4.19900	2200
2400	1.0000	2.50000	21.3245	23.8245	6.96791	34.3824	44.8256	4.47900	2400
2600	1.0000	2.50000	21.5046	24.0046	6.96791	34.7779	45.0261	4.77900	2600
2800	1.0000	2.50000	21.6500	24.1500	6.96791	35.1387	45.1953	5.09900	2800
3000	1.0000	2.50000	21.7823	24.2823	6.96791	35.4700	45.3441	5.43900	3000
3200	1.0000	2.50000	21.8937	24.3937	6.96791	35.7765	45.5776	5.79900	3200
3400	1.0000	2.50000	21.9952	24.4952	6.96791	36.0630	45.7991	6.17900	3400
3600	1.0000	2.50000	22.0873	24.5873	6.96791	36.3345	46.0096	6.57900	3600
3800	1.0000	2.50000	22.1700	24.6700	6.96791	36.5950	46.2091	6.99900	3800
4000	1.0000	2.50000	22.2435	24.7435	6.96791	36.8455	46.3986	7.43900	4000
4200	1.0000	2.50000	22.3080	24.8080	6.96791	37.0860	46.5781	7.89900	4200
4400	1.0000	2.50000	22.3645	24.8645	6.96791	37.3175	46.7496	8.37900	4400
4600	1.0000	2.50000	22.4120	24.9120	6.96791	37.5400	46.9121	8.87900	4600
4800	1.0000	2.50000	22.4505	24.9505	6.96791	37.7545	47.0666	9.39900	4800
5000	1.0000	2.50000	22.4800	24.9800	6.96791	37.9610	47.2131	9.93900	5000
5200	1.0000	2.50000	22.5005	25.0005	6.96791	38.1595	47.3516	10.49900	5200
5400	1.0000	2.50000	22.5120	25.0120	6.96791	38.3500	47.4821	11.07900	5400
5600	1.0000	2.50000	22.5145	25.0145	6.96791	38.5325	47.6046	11.67900	5600
5800	1.0000	2.50000	22.5080	25.0080	6.96791	38.7070	47.7191	12.29900	5800
6000	1.0000	2.50000	22.4925	24.9925	6.96791	38.8735	47.8256	12.93900	6000
6200	1.0000	2.50000	22.4680	24.9680	6.96791	39.0320	47.9241	13.59900	6200
6400	1.0000	2.50000	22.4345	24.9345	6.96791	39.1825	48.0156	14.27900	6400
6600	1.0000	2.50000	22.3920	24.8920	6.96791	39.3250	48.1001	14.97900	6600
6800	1.0000	2.50000	22.3405	24.8405	6.96791	39.4595	48.1786	15.69900	6800
7000	1.0000	2.50000	22.2800	24.7800	6.96791	39.5860	48.2511	16.43900	7000
7200	1.0000	2.50000	22.2105	24.7105	6.96791	39.7045	48.3186	17.19900	7200
7400	1.0000	2.50000	22.1320	24.6320	6.96791	39.8150	48.3811	17.97900	7400
7600	1.0000	2.50000	22.0445	24.5445	6.96791	39.9175	48.4386	18.77900	7600
7800	1.0000	2.50000	21.9480	24.4480	6.96791	40.0120	48.4911	19.59900	7800
8000	1.0000	2.50000	21.8425	24.3425	6.96791	40.1085	48.5386	20.43900	8000
8200	1.0000	2.50000	21.7280	24.2280	6.96791	40.1970	48.5811	21.29900	8200
8400	1.0000	2.50000	21.6045	24.1045	6.96791	40.2785	48.6186	22.17900	8400
8600	1.0000	2.50000	21.4720	23.9720	6.96791	40.3520	48.6511	23.07900	8600
8800	1.0000	2.50000	21.3305	23.8305	6.96791	40.4185	48.6786	23.99900	8800
9000	1.0000	2.50000	21.1800	23.6800	6.96791	40.4780	48.7011	24.93900	9000
9200	1.0000	2.50000	21.0205	23.5205	6.96791	40.5305	48.7186	25.89900	9200
9400	1.0000	2.50000	20.8520	23.3520	6.96791	40.5760	48.7311	26.87900	9400
9600	1.0000	2.50000	20.6745	23.1745	6.96791	40.6145	48.7386	27.87900	9600
9800	1.0000	2.50000	20.4880	22.9880	6.96791	40.6460	48.7411	28.89900	9800
10000	1.0000	2.50000	20.2935	22.7935	6.96791	40.6705	48.7386	29.93900	10000

TABLE 6 (CONT.). IDEAL GAS FUNCTIONS FOR AIR

TEMP. (°F)	ENTHALPY Btu/lbm	ENTHALPY kJ/kg	ENTHALPY Btu/lbm	ENTHALPY kJ/kg	ENTHALPY Btu/lbm	ENTHALPY kJ/kg	ENTHALPY Btu/lbm	ENTHALPY kJ/kg	ENTHALPY Btu/lbm	ENTHALPY kJ/kg	TEMP. (°F)
10000	1.0000	2.50000	24.0000	27.9920	4.94001	94.4000	2.90176	04	4.94000	04	10000
10000	1.0001	2.50000	24.0113	27.9933	4.94006	94.4013	2.90176	04	4.94006	04	10000
10000	1.0002	2.50000	24.0226	27.9946	4.94011	94.4026	2.90176	04	4.94011	04	10000
10000	1.0003	2.50000	24.0339	27.9959	4.94016	94.4039	2.90176	04	4.94016	04	10000
10000	1.0004	2.50000	24.0452	27.9972	4.94021	94.4052	2.90176	04	4.94021	04	10000
10000	1.0005	2.50000	24.0565	27.9985	4.94026	94.4065	2.90176	04	4.94026	04	10000
10000	1.0006	2.50000	24.0678	27.9998	4.94031	94.4078	2.90176	04	4.94031	04	10000
10000	1.0007	2.50000	24.0791	28.0011	4.94036	94.4091	2.90176	04	4.94036	04	10000
10000	1.0008	2.50000	24.0904	28.0024	4.94041	94.4104	2.90176	04	4.94041	04	10000
10000	1.0009	2.50000	24.1017	28.0037	4.94046	94.4117	2.90176	04	4.94046	04	10000
10000	1.0010	2.50000	24.1130	28.0050	4.94051	94.4130	2.90176	04	4.94051	04	10000
10000	1.0011	2.50000	24.1243	28.0063	4.94056	94.4143	2.90176	04	4.94056	04	10000
10000	1.0012	2.50000	24.1356	28.0076	4.94061	94.4156	2.90176	04	4.94061	04	10000
10000	1.0013	2.50000	24.1469	28.0089	4.94066	94.4169	2.90176	04	4.94066	04	10000
10000	1.0014	2.50000	24.1582	28.0102	4.94071	94.4182	2.90176	04	4.94071	04	10000
10000	1.0015	2.50000	24.1695	28.0115	4.94076	94.4195	2.90176	04	4.94076	04	10000
10000	1.0016	2.50000	24.1808	28.0128	4.94081	94.4208	2.90176	04	4.94081	04	10000
10000	1.0017	2.50000	24.1921	28.0141	4.94086	94.4221	2.90176	04	4.94086	04	10000
10000	1.0018	2.50000	24.2034	28.0154	4.94091	94.4234	2.90176	04	4.94091	04	10000
10000	1.0019	2.50000	24.2147	28.0167	4.94096	94.4247	2.90176	04	4.94096	04	10000
10000	1.0020	2.50000	24.2260	28.0180	4.94101	94.4260	2.90176	04	4.94101	04	10000
10000	1.0021	2.50000	24.2373	28.0193	4.94106	94.4273	2.90176	04	4.94106	04	10000
10000	1.0022	2.50000	24.2486	28.0206	4.94111	94.4286	2.90176	04	4.94111	04	10000
10000	1.0023	2.50000	24.2599	28.0219	4.94116	94.4299	2.90176	04	4.94116	04	10000
10000	1.0024	2.50000	24.2712	28.0232	4.94121	94.4312	2.90176	04	4.94121	04	10000
10000	1.0025	2.50000	24.2825	28.0245	4.94126	94.4325	2.90176	04	4.94126	04	10000
10000	1.0026	2.50000	24.2938	28.0258	4.94131	94.4338	2.90176	04	4.94131	04	10000
10000	1.0027	2.50000	24.3051	28.0271	4.94136	94.4351	2.90176	04	4.94136	04	10000
10000	1.0028	2.50000	24.3164	28.0284	4.94141	94.4364	2.90176	04	4.94141	04	10000
10000	1.0029	2.50000	24.3277	28.0297	4.94146	94.4377	2.90176	04	4.94146	04	10000
10000	1.0030	2.50000	24.3390	28.0310	4.94151	94.4390	2.90176	04	4.94151	04	10000
10000	1.0031	2.50000	24.3503	28.0323	4.94156	94.4403	2.90176	04	4.94156	04	10000
10000	1.0032	2.50000	24.3616	28.0336	4.94161	94.4416	2.90176	04	4.94161	04	10000
10000	1.0033	2.50000	24.3729	28.0349	4.94166	94.4429	2.90176	04	4.94166	04	10000
10000	1.0034	2.50000	24.3842	28.0362	4.94171	94.4442	2.90176	04	4.94171	04	10000
10000	1.0035	2.50000	24.3955	28.0375	4.94176	94.4455	2.90176	04	4.94176	04	10000
10000	1.0036	2.50000	24.4068	28.0388	4.94181	94.4468	2.90176	04	4.94181	04	10000
10000	1.0037	2.50000	24.4181	28.0401	4.94186	94.4481	2.90176	04	4.94186	04	10000
10000	1.0038	2.50000	24.4294	28.0414	4.94191	94.4494	2.90176	04	4.94191	04	10000
10000	1.0039	2.50000	24.4407	28.0427	4.94196	94.4507	2.90176	04	4.94196	04	10000
10000	1.0040	2.50000	24.4520	28.0440	4.94201	94.4520	2.90176	04	4.94201	04	10000
10000	1.0041	2.50000	24.4633	28.0453	4.94206	94.4533	2.90176	04	4.94206	04	10000
10000	1.0042	2.50000	24.4746	28.0466	4.94211	94.4546	2.90176	04	4.94211	04	10000
10000	1.0043	2.50000	24.4859	28.0479	4.94216	94.4559	2.90176	04	4.94216	04	10000
10000	1.0044	2.50000	24.4972	28.0492	4.94221	94.4572	2.90176	04	4.94221	04	10000
10000	1.0045	2.50000	24.5085	28.0505	4.94226	94.4585	2.90176	04	4.94226	04	10000
10000	1.0046	2.50000	24.5198	28.0518	4.94231	94.4598	2.90176	04	4.94231	04	10000
10000	1.0047	2.50000	24.5311	28.0531	4.94236	94.4611	2.90176	04	4.94236	04	10000
10000	1.0048	2.50000	24.5424	28.0544	4.94241	94.4624	2.90176	04	4.94241	04	10000
10000	1.0049	2.50000	24.5537	28.0557	4.94246	94.4637	2.90176	04	4.94246	04	10000
10000	1.0050	2.50000	24.5650	28.0570	4.94251	94.4650	2.90176	04	4.94251	04	10000
10000	1.0051	2.50000	24.5763	28.0583	4.94256	94.4663	2.90176	04	4.94256	04	10000
10000	1.0052	2.50000	24.5876	28.0596	4.94261	94.4676	2.90176	04	4.94261	04	10000
10000	1.0053	2.50000	24.5989	28.0609	4.94266	94.4689	2.90176	04	4.94266	04	10000
10000	1.0054	2.50000	24.6102	28.0622	4.94271	94.4702	2.90176	04	4.94271	04	10000
10000	1.0055	2.50000	24.6215	28.0635	4.94276	94.4715	2.90176	04	4.94276	04	10000
10000	1.0056	2.50000	24.6328	28.0648	4.94281	94.4728	2.90176	04	4.94281	04	10000
10000	1.0057	2.50000	24.6441	28.0661	4.94286	94.4741	2.90176	04	4.94286	04	10000
10000	1.0058	2.50000	24.6554	28.0674	4.94291	94.4754	2.90176	04	4.94291	04	10000
10000	1.0059	2.50000	24.6667	28.0687	4.94296	94.4767	2.90176	04	4.94296	04	10000
10000	1.0060	2.50000	24.6780	28.0700	4.94301	94.4780	2.90176	04	4.94301	04	10000
10000	1.0061	2.50000	24.6893	28.0713	4.94306	94.4793	2.90176	04	4.94306	04	10000
10000	1.0062	2.50000	24.7006	28.0726	4.94311	94.4806	2.90176	04	4.94311	04	10000
10000	1.0063	2.50000	24.7119	28.0739	4.94316	94.4819	2.90176	04	4.94316	04	10000
10000	1.0064	2.50000	24.7232	28.0752	4.94321	94.4832	2.90176	04	4.94321	04	10000
10000	1.0065	2.50000	24.7345	28.0765	4.94326	94.4845	2.90176	04	4.94326	04	10000
10000	1.0066	2.50000	24.7458	28.0778	4.94331	94.4858	2.90176	04	4.94331	04	10000
10000	1.0067	2.50000	24.7571	28.0791	4.94336	94.4871	2.90176	04	4.94336	04	10000
10000	1.0068	2.50000	24.7684	28.0804	4.94341	94.4884	2.90176	04	4.94341	04	10000
10000	1.0069	2.50000	24.7797	28.0817	4.94346	94.4897	2.90176	04	4.94346	04	10000
10000	1.0070	2.50000	24.7910	28.0830	4.94351	94.4910	2.90176	04	4.94351	04	10000
10000	1.0071	2.50000	24.8023	28.0843	4.94356	94.4923	2.90176	04	4.94356	04	10000
10000	1.0072	2.50000	24.8136	28.0856	4.94361	94.4936	2.90176	04	4.94361	04	10000
10000	1.0073	2.50000	24.8249	28.0869	4.94366	94.4949	2.90176	04	4.94366	04	10000
10000	1.0074	2.50000	24.8362	28.0882	4.94371	94.4962	2.90176	04	4.94371	04	10000
10000	1.0075	2.50000	24.8475	28.0895	4.94376	94.4975	2.90176	04	4.94376	04	10000
10000	1.0076	2.50000	24.8588	28.0908	4.94381	94.4988	2.90176	04	4.94381	04	10000
10000	1.0077	2.50000	24.8701	28.0921	4.94386	94.5001	2.90176	04	4.94386	04	10000
10000	1.0078	2.50000	24.8814	28.0934	4.94391	94.5014	2.90176	04	4.94391	04	10000
10000	1.0079	2.50000	24.8927	28.0947	4.94396	94.5027	2.90176	04	4.94396	04	10000
10000	1.0080	2.50000	24.9040	28.0960	4.94401	94.5040	2.90176	04	4.94401	04	10000
10000	1.0081	2.50000	24.9153	28.0973	4.94406	94.5053	2.90176	04	4.94406	04	10000
10000	1.0082	2.50000	24.9266	28.0986	4.94411	94.5066	2.90176	04	4.94411	04	10000
10000	1.0083	2.50000	24.9379	28.0999	4.94416	94.5079	2.90176	04	4.94416	04	10000
10000	1.0084	2.50000	24.9492	28.1012	4.94421	94.5092	2.90176	04	4.94421	04	10000
10000	1.0085	2.50000	24.9605	28.1025	4.94426	94.5105	2.90176	04	4.94426	04	10000
10000	1.0086	2.50000	24.9718	28.1038	4.94431	94.5118	2.90176	04	4.94431	04	10000
10000	1.0087	2.50000	24.9831	28.1051	4.94436	94.5131	2.90176	04	4.94436	04	10000
10000	1.0088	2.50000	24.9944	28.1064	4.94441	94.5144	2.90176	04	4.94441	04	10000
10000	1.0089	2.50000	25.0057	28.1077	4.94446	94.5157	2.90176	04	4.94446	04	10000
10000	1.0090	2.50000	25.0170	28.1090	4.94451	94.5170	2.90176				

TABLE 7. IDEAL GAS FUNCTIONS FOR C+ (ATOMIC WEIGHT 12.0108, $R = 1.98717$ CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 51 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{W^0 - E^0}{RT}$	$-\frac{E^0 - E^1}{RT}$	Δn	$W^0 - E^0 - \frac{E^0 - E^1}{RT}$	$-\frac{E^0 - E^1}{RT}$	$E^0 - E^1$	$-\frac{W^0 - E^0}{RT}$	$-\frac{W^0 - E^0}{RT} - \frac{E^0 - E^1}{RT}$	TEMP. (°K)				
1000	5.4481	2.59048	19.0644	21.4239	5.06410	37.0642	42.9783	3.00096	03	5.00416	03	3.70046	04	1000
1200	5.7805	2.54083	19.5362	22.0000	5.06494	38.0000	43.0744	3.00096	03	5.00416	03	3.70046	04	1200
1400	5.7454	2.54288	19.5227	22.4456	5.06512	38.5977	43.6628	3.00096	03	5.00416	03	3.70046	04	1400
1600	5.7763	2.53762	20.2619	22.7995	5.06546	40.2637	45.3064	3.00096	03	5.00416	03	3.70046	04	1600
1800	5.8065	2.53352	20.5405	23.0900	5.06572	40.5917	45.6917	3.00096	03	5.00416	03	3.70046	04	1800
2000	5.8200	2.53022	20.8273	23.3575	5.06796	41.3073	46.4152	3.00096	03	5.00416	03	3.70046	04	2000
2200	5.8360	2.52751	21.0843	23.5958	5.06842	41.6662	46.8008	3.00096	03	5.00416	03	3.70046	04	2200
2400	5.8494	2.52525	21.2781	23.8134	5.06899	42.3030	47.3211	3.00096	03	5.00416	03	3.70046	04	2400
2600	5.8608	2.52333	21.4902	24.0135	5.06945	42.7045	47.7180	3.00096	03	5.00416	03	3.70046	04	2600
2800	5.8704	2.52146	21.6771	24.1900	5.06980	43.0740	48.0070	3.00096	03	5.00416	03	3.70046	04	2800
3000	5.8791	2.52025	21.8510	24.3713	5.07016	43.4215	48.4290	3.00096	03	5.00416	03	3.70046	04	3000
3200	5.8865	2.51900	22.0137	24.5127	5.07056	43.7448	48.7505	3.00096	03	5.00416	03	3.70046	04	3200
3400	5.8931	2.51789	22.1643	24.6262	5.07097	44.0482	49.0517	3.00096	03	5.00416	03	3.70046	04	3400
3600	5.8990	2.51691	22.3102	24.8271	5.07131	44.3341	49.3356	3.00096	03	5.00416	03	3.70046	04	3600
3800	5.9042	2.51603	22.4463	24.9623	5.07166	44.6045	49.6045	3.00096	03	5.00416	03	3.70046	04	3800
4000	5.9090	2.51523	22.5753	25.0906	5.07199	44.8609	49.8591	3.00096	03	5.00416	03	3.70046	04	4000
4200	5.9133	2.51452	22.6980	25.2125	5.07237	45.1097	50.1051	3.00096	03	5.00416	03	3.70046	04	4200
4400	5.9172	2.51389	22.8150	25.3289	5.07269	45.3549	50.3326	3.00096	03	5.00416	03	3.70046	04	4400
4600	5.9207	2.51329	22.9267	25.4400	5.07298	45.5952	50.5535	3.00096	03	5.00416	03	3.70046	04	4600
4800	5.9240	2.51277	23.0337	25.5464	5.07326	45.8310	50.7650	3.00096	03	5.00416	03	3.70046	04	4800
5000	5.9271	2.51231	23.1362	25.6485	5.07354	46.0629	50.9679	3.00096	03	5.00416	03	3.70046	04	5000
5200	5.9299	2.51190	23.2348	25.7467	5.07381	46.2915	51.1629	3.00096	03	5.00416	03	3.70046	04	5200
5400	5.9325	2.51155	23.3296	25.8411	5.07408	46.5167	51.3505	3.00096	03	5.00416	03	3.70046	04	5400
5600	5.9350	2.51125	23.4209	25.9321	5.07434	46.7412	51.5315	3.00096	03	5.00416	03	3.70046	04	5600
5800	5.9373	2.51103	23.5096	26.0200	5.07460	46.9652	51.7061	3.00096	03	5.00416	03	3.70046	04	5800
6000	5.9395	2.51087	23.5961	26.1050	5.07485	47.1895	51.8750	3.00096	03	5.00416	03	3.70046	04	6000
6200	5.9416	2.51078	23.6795	26.1872	5.07510	47.4727	52.0384	3.00096	03	5.00416	03	3.70046	04	6200
6400	5.9436	2.51077	23.7562	26.2670	5.07534	47.7552	52.1968	3.00096	03	5.00416	03	3.70046	04	6400
6600	5.9454	2.51085	23.8334	26.3443	5.07558	48.0370	52.3505	3.00096	03	5.00416	03	3.70046	04	6600
6800	5.9475	2.51103	23.9004	26.4194	5.07582	48.3180	52.4990	3.00096	03	5.00416	03	3.70046	04	6800
7000	5.9495	2.51130	23.9612	26.4929	5.07606	48.5984	52.6430	3.00096	03	5.00416	03	3.70046	04	7000
7200	5.9516	2.51149	24.0219	26.5634	5.07630	48.8784	52.7829	3.00096	03	5.00416	03	3.70046	04	7200
7400	5.9533	2.51159	24.1208	26.6330	5.07654	49.1579	52.9181	3.00096	03	5.00416	03	3.70046	04	7400
7600	5.9553	2.51181	24.1878	26.7000	5.07678	49.4369	53.0495	3.00096	03	5.00416	03	3.70046	04	7600
7800	5.9573	2.51156	24.2531	26.7666	5.07702	49.7154	53.1767	3.00096	03	5.00416	03	3.70046	04	7800
8000	5.9595	2.51445	24.3167	26.8312	5.07726	49.9934	53.3179	3.00096	03	5.00416	03	3.70046	04	8000
8200	5.9617	2.51548	24.3788	26.8943	5.07750	50.2709	53.4544	3.00096	03	5.00416	03	3.70046	04	8200
8400	5.9640	2.51666	24.4394	26.9561	5.07774	50.5482	53.5862	3.00096	03	5.00416	03	3.70046	04	8400
8600	5.9664	2.51799	24.4987	27.0167	5.07798	50.8257	53.7134	3.00096	03	5.00416	03	3.70046	04	8600
8800	5.9690	2.51948	24.5566	27.0761	5.07822	51.1029	53.8366	3.00096	03	5.00416	03	3.70046	04	8800
9000	5.9717	2.52113	24.6132	27.1343	5.07846	51.3804	53.9552	3.00096	03	5.00416	03	3.70046	04	9000
9200	5.9746	2.52294	24.6686	27.1916	5.07870	51.6579	54.0694	3.00096	03	5.00416	03	3.70046	04	9200
9400	5.9777	2.52482	24.7229	27.2478	5.07894	51.9354	54.1791	3.00096	03	5.00416	03	3.70046	04	9400
9600	5.9809	2.52707	24.7781	27.3032	5.07918	52.2129	54.2849	3.00096	03	5.00416	03	3.70046	04	9600
9800	5.9844	2.52950	24.8352	27.3576	5.07942	52.4904	54.3861	3.00096	03	5.00416	03	3.70046	04	9800

TABLE 7 (CONT.). IDEAL GAS FUNCTIONS FOR C₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - \epsilon^2}{RT}$	$\ln \frac{h^2 - \epsilon^2}{RT}$	$\ln \frac{h^2 - \epsilon^2}{RT} - \ln \frac{h^2 - \epsilon^2}{RT}$	$\ln \frac{h^2 - \epsilon^2}{RT}$	$\ln \frac{h^2 - \epsilon^2}{RT}$	$\ln \frac{h^2 - \epsilon^2}{RT}$	$\ln \frac{h^2 - \epsilon^2}{RT}$	$\ln \frac{h^2 - \epsilon^2}{RT}$	TEMP. (°K)
1000	5.9681	2.53107	24.0994	27.0112	9.09124	40.4986	94.4986	1.0441E 04	5.0312E 04	10000
1050	5.9984	2.53883	25.0030	27.5419	9.04507	49.4852	94.4852	1.0441E 04	5.0312E 04	10500
11000	6.0103	2.54483	25.1213	27.6682	9.04098	49.9202	94.9202	1.0441E 04	5.0312E 04	11000
11500	6.0240	2.55386	25.2347	27.7906	9.07081	50.1456	95.1456	1.0441E 04	5.0312E 04	11500
12000	6.0394	2.56586	25.3437	27.9096	9.09879	50.3622	95.3622	1.0441E 04	5.0312E 04	12000
12500	6.0572	2.57678	25.4487	28.0255	9.12048	50.5708	95.5708	1.0441E 04	5.0312E 04	12500
13000	6.0769	2.58695	25.5500	28.1385	9.14387	50.7720	95.7720	1.0441E 04	5.0312E 04	13000
13500	6.0984	2.60110	25.6479	28.2490	9.16882	50.9666	95.9666	1.0441E 04	5.0312E 04	13500
14000	6.1225	2.61436	25.7427	28.3571	9.19517	51.1551	96.1551	1.0441E 04	5.0312E 04	14000
14500	6.1486	2.62826	25.8347	28.4630	9.22278	51.3379	96.3379	1.0441E 04	5.0312E 04	14500
15000	6.1769	2.64271	25.9241	28.5668	9.25150	51.5154	96.5154	1.0441E 04	5.0312E 04	15000
15500	6.2074	2.65764	26.0110	28.6686	9.28127	51.6881	96.6881	1.0441E 04	5.0312E 04	15500
16000	6.2401	2.67298	26.0956	28.7686	9.31164	51.8562	96.8562	1.0441E 04	5.0312E 04	16000
16500	6.2749	2.68867	26.1781	28.8667	9.34284	52.0202	97.0202	1.0441E 04	5.0312E 04	16500
17000	6.3118	2.70464	26.2586	28.9632	9.37457	52.1801	97.1801	1.0441E 04	5.0312E 04	17000
17500	6.3508	2.72094	26.3372	29.0580	9.40674	52.3364	97.3364	1.0441E 04	5.0312E 04	17500
18000	6.3919	2.73721	26.4141	29.1513	9.43920	52.4892	97.4892	1.0441E 04	5.0312E 04	18000
18500	6.4351	2.75370	26.4893	29.2430	9.47206	52.6386	97.6386	1.0441E 04	5.0312E 04	18500
19000	6.4802	2.77028	26.5630	29.3332	9.50530	52.7850	97.7850	1.0441E 04	5.0312E 04	19000
19500	6.5272	2.78691	26.6351	29.4220	9.53895	52.9284	97.9284	1.0441E 04	5.0312E 04	19500
20000	6.5762	2.80356	26.7059	29.5095	9.57114	53.0690	98.0690	1.0441E 04	5.0312E 04	20000
20500	6.6264	2.82022	26.7762	29.5962	9.60282	53.2062	98.2062	1.0441E 04	5.0312E 04	20500
21000	6.6784	2.83689	26.8453	29.6822	9.63400	53.3400	98.3400	1.0441E 04	5.0312E 04	21000
21500	6.7318	2.85356	26.9130	29.7675	9.66468	53.4718	98.4718	1.0441E 04	5.0312E 04	21500
22000	6.7864	2.87022	26.9793	29.8522	9.69486	53.6018	98.6018	1.0441E 04	5.0312E 04	22000
22500	6.8422	2.88689	27.0443	29.9362	9.72454	53.7290	98.7290	1.0441E 04	5.0312E 04	22500
23000	6.8992	2.90356	27.1286	30.0195	9.75372	53.8535	98.8535	1.0441E 04	5.0312E 04	23000
23500	6.9574	2.92022	27.2121	30.1022	9.78240	53.9755	98.9755	1.0441E 04	5.0312E 04	23500
24000	7.0168	2.93689	27.2948	30.1845	9.81058	54.0950	99.0950	1.0441E 04	5.0312E 04	24000
24500	7.0774	2.95356	27.3768	30.2662	9.83826	54.2122	99.2122	1.0441E 04	5.0312E 04	24500
25000	7.1392	2.97022	27.4581	30.3475	9.86544	54.3275	99.3275	1.0441E 04	5.0312E 04	25000
25500	7.2022	2.98689	27.5388	30.4282	9.89212	54.4408	99.4408	1.0441E 04	5.0312E 04	25500
26000	7.2664	2.99356	27.6188	30.5085	9.91830	54.5522	99.5522	1.0441E 04	5.0312E 04	26000
26500	7.3318	3.01022	27.6981	30.5882	9.94398	54.6618	99.6618	1.0441E 04	5.0312E 04	26500
27000	7.3984	3.02689	27.7768	30.6675	9.96916	54.7695	99.7695	1.0441E 04	5.0312E 04	27000
27500	7.4662	3.04356	27.8548	30.7462	9.99384	54.8750	99.8750	1.0441E 04	5.0312E 04	27500
28000	7.5352	3.06022	27.9321	30.8245	10.01802	54.9788	99.9788	1.0441E 04	5.0312E 04	28000
28500	7.6054	3.07689	28.0088	30.9022	10.04170	55.0808	100.0808	1.0441E 04	5.0312E 04	28500
29000	7.6768	3.09356	28.0848	30.9795	10.06498	55.1810	100.1810	1.0441E 04	5.0312E 04	29000
29500	7.7494	3.11022	28.1601	31.0562	10.08776	55.2795	100.2795	1.0441E 04	5.0312E 04	29500
30000	7.8232	3.12689	28.2348	31.1325	10.11004	55.3762	100.3762	1.0441E 04	5.0312E 04	30000
30500	7.8982	3.14356	28.3088	31.2082	10.13182	55.4710	100.4710	1.0441E 04	5.0312E 04	30500
31000	7.9744	3.16022	28.3821	31.2835	10.15310	55.5640	100.5640	1.0441E 04	5.0312E 04	31000
31500	8.0518	3.17689	28.4548	31.3582	10.17398	55.6555	100.6555	1.0441E 04	5.0312E 04	31500
32000	8.1304	3.19356	28.5268	31.4325	10.19436	55.7455	100.7455	1.0441E 04	5.0312E 04	32000
32500	8.2102	3.21022	28.5981	31.5062	10.21424	55.8340	100.8340	1.0441E 04	5.0312E 04	32500
33000	8.2912	3.22689	28.6688	31.5795	10.23362	55.9210	100.9210	1.0441E 04	5.0312E 04	33000
33500	8.3734	3.24356	28.7388	31.6522	10.25250	56.0065	101.0065	1.0441E 04	5.0312E 04	33500
34000	8.4568	3.26022	28.8081	31.7245	10.27098	56.0905	101.0905	1.0441E 04	5.0312E 04	34000
34500	8.5414	3.27689	28.8768	31.7962	10.28896	56.1730	101.1730	1.0441E 04	5.0312E 04	34500
35000	8.6272	3.29356	28.9448	31.8675	10.30644	56.2540	101.2540	1.0441E 04	5.0312E 04	35000
35500	8.7142	3.31022	29.0121	31.9382	10.32352	56.3335	101.3335	1.0441E 04	5.0312E 04	35500
36000	8.8024	3.32689	29.0788	32.0085	10.34010	56.4115	101.4115	1.0441E 04	5.0312E 04	36000
36500	8.8918	3.34356	29.1448	32.0782	10.35618	56.4880	101.4880	1.0441E 04	5.0312E 04	36500
37000	8.9824	3.36022	29.2101	32.1475	10.37176	56.5630	101.5630	1.0441E 04	5.0312E 04	37000
37500	9.0742	3.37689	29.2748	32.2162	10.38684	56.6365	101.6365	1.0441E 04	5.0312E 04	37500
38000	9.1672	3.39356	29.3388	32.2845	10.40142	56.7085	101.7085	1.0441E 04	5.0312E 04	38000
38500	9.2614	3.41022	29.4021	32.3522	10.41550	56.7790	101.7790	1.0441E 04	5.0312E 04	38500
39000	9.3568	3.42689	29.4648	32.4195	10.42908	56.8480	101.8480	1.0441E 04	5.0312E 04	39000
39500	9.4534	3.44356	29.5268	32.4862	10.44216	56.9155	101.9155	1.0441E 04	5.0312E 04	39500
40000	9.5512	3.46022	29.5881	32.5525	10.45474	56.9815	101.9815	1.0441E 04	5.0312E 04	40000
40500	9.6502	3.47689	29.6488	32.6182	10.46682	57.0460	102.0460	1.0441E 04	5.0312E 04	40500
41000	9.7504	3.49356	29.7088	32.6835	10.47840	57.1090	102.1090	1.0441E 04	5.0312E 04	41000
41500	9.8518	3.51022	29.7681	32.7482	10.48958	57.1705	102.1705	1.0441E 04	5.0312E 04	41500
42000	9.9544	3.52689	29.8268	32.8125	10.50026	57.2305	102.2305	1.0441E 04	5.0312E 04	42000
42500	10.0582	3.54356	29.8848	32.8762	10.51054	57.2890	102.2890	1.0441E 04	5.0312E 04	42500
43000	10.1632	3.56022	29.9421	32.9395	10.52032	57.3460	102.3460	1.0441E 04	5.0312E 04	43000
43500	10.2694	3.57689	29.9988	33.0022	10.52960	57.4015	102.4015	1.0441E 04	5.0312E 04	43500
44000	10.3768	3.59356	30.0548	33.0645	10.53838	57.4555	102.4555	1.0441E 04	5.0312E 04	44000
44500	10.4854	3.61022	30.1101	33.1262	10.54666	57.5080	102.5080	1.0441E 04	5.0312E 04	44500
45000	10.5952	3.62689	30.1648	33.1875	10.55444	57.5590	102.5590	1.0441E 04	5.0312E 04	45000
45500	10.7062	3.64356	30.2188	33.2482	10.56172	57.6090	102.6090	1.0441E 04	5.0312E 04	45500
46000	10.8184	3.66022	30.2721	33.3085	10.56850	57.6575	102.6575	1.0441E 04	5.0312E 04	46000
46500	10.9318	3.67689	30.3248	33.3682	10.57478	57.7045	102.7045	1.0441E 04	5.0312E 04	46500
47000	11.0464	3.69356	30.3768	33.4275	10.58056	57.7500	102.7500	1.0441E 04	5.0312E 04	47000
47500	11.1622	3.71022	30.4281	33.4862	10.58584	57.7940	102.7940	1.0441E 04	5.0312E 04	47500
48000	11.2792	3.72689	30.4788	33.5445	10.59062	57.8365	102.8365	1.0441E 04	5.0312E 04	48000
48500	11.3974	3.74356	30.5288	33.6022	10.59490	57.8775	102.8775	1.0441E 04	5.0312E 04	48500
49000	11.5168	3.76022	30.5781	33.6595	10.59868	57.9170	102.9170	1.0441E 04	5.0312E 04	49000
49500	11.6374	3.77689	30.6268	33.7162	10.60196	57.9550	102.9550	1.0441E 04	5.0312E 04	49500
50000	11.7592	3.79356	30.6748	33.7725	10.60474	57.9915	102.9915	1.0441E 04	5.0312E 04	50000

TABLE 8. TOTAL GAS FUNCTIONS FOR H₂ IONIC WAVELENGTH 14,000.2, R = 1.9717 CAL/PWOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS IN S_A. SEE TABLE 52 FOR LIST OF STATES USED.

[illegible]

TABLE 8 (CONT.). IDEAL GAS FUNCTIONS FOR N₂

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	$\frac{h^2 - c}{RT}$	TEMP. (°K)
10000	9.4529	2.64945	25.5465	28.2159	5.26490	50.8040	56.0497	3.27778	0.4	5.08058	10000
10500	9.5239	2.63734	25.4899	28.3533	5.28062	51.0621	56.3627	3.45818	0.4	5.34478	10500
11000	9.5956	2.62487	25.4337	28.4864	5.29854	51.3093	56.6735	3.63828	0.4	5.61381	11000
11500	9.6677	2.61201	25.3783	28.6183	5.31873	51.5438	56.9835	3.82098	0.4	5.87755	11500
12000	9.7401	2.60080	25.3232	28.7510	5.34022	51.7760	57.2935	4.00338	0.4	6.14622	12000
12500	9.8128	2.68528	26.1617	28.8870	5.36609	51.9876	57.6037	4.18628	0.4	6.41985	12500
13000	9.8855	2.69147	26.2671	28.9586	5.38839	52.1971	57.9140	4.36962	0.4	6.69348	13000
13500	9.9583	2.69740	26.3688	29.0362	5.40917	52.3992	58.2242	4.55346	0.4	6.96708	13500
14000	10.0311	2.70310	26.4670	29.1101	5.42911	52.5943	58.5345	4.73818	0.4	7.24068	14000
14500	10.1039	2.70860	26.5620	29.1706	5.44844	52.7830	58.8448	4.92318	0.4	7.51428	14500
15000	10.1765	2.71393	26.6539	29.2378	5.46730	52.9657	59.1551	5.10838	0.4	7.78788	15000
15500	10.2490	2.71911	26.7430	29.3021	5.48583	53.1427	59.4654	5.29368	0.4	8.06148	15500
16000	10.3214	2.72416	26.8294	29.3635	5.50403	53.3144	59.7757	5.47918	0.4	8.33508	16000
16500	10.3936	2.72911	26.9133	29.4224	5.52188	53.4811	60.0860	5.66468	0.4	8.60868	16500
17000	10.4657	2.73397	26.9948	29.4788	5.53938	53.6432	60.3963	5.85018	0.4	8.88228	17000
17500	10.5376	2.73878	27.0741	29.5329	5.55650	53.8008	60.7066	6.03568	0.4	9.15588	17500
18000	10.6095	2.74354	27.1514	29.5849	5.57332	53.9542	61.0169	6.22118	0.4	9.42948	18000
18500	10.6812	2.74828	27.2284	29.6349	5.58994	54.1037	61.3272	6.40668	0.4	9.70308	18500
19000	10.7528	2.75301	27.3031	29.6830	5.60636	54.2495	61.6375	6.59218	0.4	9.97668	19000
19500	10.8244	2.75776	27.3715	29.7293	5.62256	54.3917	61.9478	6.77768	0.4	10.25028	19500
20000	10.8959	2.76253	27.4414	29.7739	5.63856	54.5306	62.2581	6.96318	0.4	10.52388	20000
20500	11.1822	2.76828	27.7056	30.4878	5.65440	54.6654	62.5684	7.14868	0.4	10.79748	20500
21000	11.4705	2.80351	27.9486	30.7521	5.67014	54.7963	62.8787	7.33418	0.4	11.07108	21000
21500	11.7634	2.82743	28.1739	31.0014	5.68578	54.9232	63.1890	7.51968	0.4	11.34468	21500
22000	12.0642	2.85495	28.3844	31.2394	5.69932	55.0466	63.4993	7.70518	0.4	11.61828	22000
22500	12.3764	2.88709	28.5825	31.4696	5.71173	55.1661	63.8096	7.89068	0.4	11.89188	22500
23000	12.7044	2.92489	28.7700	31.6949	5.72304	55.2824	64.1199	8.07618	0.4	12.16548	23000
23500	13.0529	2.96933	28.9486	31.9179	5.73326	55.3954	64.4302	8.26168	0.4	12.43908	23500
24000	13.4270	3.02125	29.1197	32.1410	5.74236	55.5054	64.7405	8.44718	0.4	12.71268	24000
24500	13.8325	3.08131	29.2847	32.3640	5.75036	55.6124	65.0508	8.63268	0.4	12.98628	24500
25000	14.2735	3.14986	29.4444	32.5893	5.75728	55.7164	65.3611	8.81818	0.4	13.25988	25000
25500	14.7624	3.22693	29.5999	32.8269	5.76312	55.8174	65.6714	9.00368	0.4	13.53348	25500
26000	15.2997	3.31222	29.7570	33.0662	5.76796	55.9154	65.9817	9.18918	0.4	13.80708	26000
26500	15.8943	3.40592	29.9012	33.3063	5.77180	56.0104	66.2920	9.37468	0.4	14.08068	26500
27000	16.5528	3.50945	30.0482	33.5525	5.77474	56.1024	66.6023	9.56018	0.4	14.35428	27000
27500	17.2819	3.63091	30.1934	33.8023	5.77678	56.1914	66.9126	9.74568	0.4	14.62788	27500

TABLE 9. IDEAL GAS FUNCTIONS FOR DIATOMIC GASES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 33 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	$\frac{h^2 - \bar{E}}{RT}$	TEMP. (°K)
1000	4.0000	2.50000	19.1499	21.0049	4.90791	30.0932	43.0211	2.90076	03	4.90791	1000
1200	4.0000	2.50000	19.0653	22.1053	4.90791	30.0932	43.0211	3.57092	03	4.90791	1200
1400	4.0000	2.50000	19.0007	22.4407	4.90791	30.0932	43.0211	4.17306	03	4.90791	1400
1600	4.0000	2.50000	18.9445	22.8245	4.90791	30.0932	43.0211	4.70926	03	4.90791	1600
1800	4.0000	2.50000	18.8940	23.2440	4.90791	30.0932	43.0211	5.18436	03	4.90791	1800
2000	4.0000	2.50000	18.8474	23.6974	4.90791	30.0932	43.0211	5.60436	03	4.90791	2000
2200	4.0000	2.50000	18.8034	24.1834	4.90791	30.0932	43.0211	5.97436	03	4.90791	2200
2400	4.0000	2.50000	18.7604	24.6904	4.90791	30.0932	43.0211	6.29436	03	4.90791	2400
2600	4.0000	2.50000	18.7179	25.2179	4.90791	30.0932	43.0211	6.56436	03	4.90791	2600
2800	4.0000	2.50000	18.6754	25.7654	4.90791	30.0932	43.0211	6.78436	03	4.90791	2800
3000	4.0000	2.50000	18.6324	26.3324	4.90791	30.0932	43.0211	6.95436	03	4.90791	3000
3200	4.0000	2.50000	18.5894	26.9194	4.90791	30.0932	43.0211	7.08436	03	4.90791	3200
3400	4.0000	2.50000	18.5464	27.5264	4.90791	30.0932	43.0211	7.17436	03	4.90791	3400
3600	4.0000	2.50000	18.5034	28.1534	4.90791	30.0932	43.0211	7.22436	03	4.90791	3600
3800	4.0000	2.50000	18.4604	28.7904	4.90791	30.0932	43.0211	7.24436	03	4.90791	3800
4000	4.0000	2.50000	18.4174	29.4374	4.90791	30.0932	43.0211	7.23436	03	4.90791	4000
4200	4.0000	2.50000	18.3744	30.0944	4.90791	30.0932	43.0211	7.19436	03	4.90791	4200
4400	4.0000	2.50000	18.3314	30.7614	4.90791	30.0932	43.0211	7.12436	03	4.90791	4400
4600	4.0000	2.50000	18.2884	31.4384	4.90791	30.0932	43.0211	7.02436	03	4.90791	4600
4800	4.0000	2.50000	18.2454	32.1254	4.90791	30.0932	43.0211	6.89436	03	4.90791	4800
5000	4.0000	2.50000	18.2024	32.8224	4.90791	30.0932	43.0211	6.73436	03	4.90791	5000
5200	4.0000	2.50000	18.1594	33.5294	4.90791	30.0932	43.0211	6.54436	03	4.90791	5200
5400	4.0000	2.50000	18.1164	34.2464	4.90791	30.0932	43.0211	6.32436	03	4.90791	5400
5600	4.0000	2.50000	18.0734	34.9734	4.90791	30.0932	43.0211	6.07436	03	4.90791	5600
5800	4.0000	2.50000	18.0304	35.7104	4.90791	30.0932	43.0211	5.79436	03	4.90791	5800
6000	4.0000	2.50000	17.9874	36.4574	4.90791	30.0932	43.0211	5.48436	03	4.90791	6000
6200	4.0000	2.50000	17.9444	37.2144	4.90791	30.0932	43.0211	5.14436	03	4.90791	6200
6400	4.0000	2.50000	17.9014	37.9814	4.90791	30.0932	43.0211	4.77436	03	4.90791	6400
6600	4.0000	2.50000	17.8584	38.7584	4.90791	30.0932	43.0211	4.37436	03	4.90791	6600
6800	4.0000	2.50000	17.8154	39.5454	4.90791	30.0932	43.0211	3.94436	03	4.90791	6800
7000	4.0000	2.50000	17.7724	40.3424	4.90791	30.0932	43.0211	3.48436	03	4.90791	7000
7200	4.0000	2.50000	17.7294	41.1494	4.90791	30.0932	43.0211	3.00436	03	4.90791	7200
7400	4.0000	2.50000	17.6864	41.9664	4.90791	30.0932	43.0211	2.50436	03	4.90791	7400
7600	4.0000	2.50000	17.6434	42.7934	4.90791	30.0932	43.0211	2.00436	03	4.90791	7600
7800	4.0000	2.50000	17.6004	43.6304	4.90791	30.0932	43.0211	1.50436	03	4.90791	7800
8000	4.0000	2.50000	17.5574	44.4774	4.90791	30.0932	43.0211	1.00436	03	4.90791	8000
8200	4.0000	2.50000	17.5144	45.3344	4.90791	30.0932	43.0211	0.50436	03	4.90791	8200
8400	4.0000	2.50000	17.4714	46.2014	4.90791	30.0932	43.0211	0.00436	03	4.90791	8400
8600	4.0000	2.50000	17.4284	47.0784	4.90791	30.0932	43.0211	-0.49564	03	4.90791	8600
8800	4.0000	2.50000	17.3854	47.9654	4.90791	30.0932	43.0211	-0.99564	03	4.90791	8800
9000	4.0000	2.50000	17.3424	48.8624	4.90791	30.0932	43.0211	-1.49564	03	4.90791	9000
9200	4.0000	2.50000	17.2994	49.7694	4.90791	30.0932	43.0211	-1.99564	03	4.90791	9200
9400	4.0000	2.50000	17.2564	50.6864	4.90791	30.0932	43.0211	-2.49564	03	4.90791	9400
9600	4.0000	2.50000	17.2134	51.6134	4.90791	30.0932	43.0211	-2.99564	03	4.90791	9600
9800	4.0000	2.50000	17.1704	52.5504	4.90791	30.0932	43.0211	-3.49564	03	4.90791	9800
10000	4.0000	2.50000	17.1274	53.4974	4.90791	30.0932	43.0211	-3.99564	03	4.90791	10000

TABLE 9 (CONT.). IDEAL GAS HEAT CAPACITIES PER MO.

TEMP. (°K.)	PAOIT. FUNK.	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	$\frac{U^0 - U^0}{T}$	TEMP. (°K.)
10000	4.2207	2.71606	24.9616	5.39904	99.0000	3.61196	5.39904	3.61196	5.39904	10000
10500	4.2769	2.74522	25.0949	5.44116	99.0077	3.61176	5.44116	3.61176	5.44116	10500
11000	4.3296	2.77960	25.2235	5.48031	99.0122	3.61156	5.48031	3.61156	5.48031	11000
11500	4.3809	2.81073	25.3471	5.51695	99.0171	3.61136	5.51695	3.61136	5.51695	11500
12000	4.4402	2.84127	25.4660	5.55097	99.0222	3.61116	5.55097	3.61116	5.55097	12000
12500	4.5133	2.87095	25.5806	5.58266	99.0275	3.61096	5.58266	3.61096	5.58266	12500
13000	4.5921	2.90095	25.6917	5.61211	99.0331	3.61076	5.61211	3.61076	5.61211	13000
13500	4.6761	2.93129	25.8000	5.64033	99.0389	3.61056	5.64033	3.61056	5.64033	13500
14000	4.7657	2.96197	25.9056	5.66734	99.0449	3.61036	5.66734	3.61036	5.66734	14000
14500	4.8613	3.00000	26.0086	5.69315	99.0511	3.61016	5.69315	3.61016	5.69315	14500
15000	4.9633	3.04100	26.1090	5.71777	99.0575	3.60996	5.71777	3.60996	5.71777	15000
15500	5.0719	3.08537	26.2068	5.74121	99.0641	3.60976	5.74121	3.60976	5.74121	15500
16000	5.1875	3.13350	26.3020	5.76347	99.0709	3.60956	5.76347	3.60956	5.76347	16000
16500	5.3104	3.18594	26.3946	5.78456	99.0779	3.60936	5.78456	3.60936	5.78456	16500
17000	5.4411	3.24300	26.4846	5.80449	99.0851	3.60916	5.80449	3.60916	5.80449	17000
17500	5.5799	3.30500	26.5720	5.82327	99.0925	3.60896	5.82327	3.60896	5.82327	17500
18000	5.7272	3.37230	26.6568	5.84191	99.1001	3.60876	5.84191	3.60876	5.84191	18000
18500	5.8833	3.44530	26.7390	5.86041	99.1079	3.60856	5.86041	3.60856	5.86041	18500
19000	6.0487	3.52350	26.8186	5.87877	99.1159	3.60836	5.87877	3.60836	5.87877	19000
19500	6.2239	3.60740	26.8956	5.89700	99.1241	3.60816	5.89700	3.60816	5.89700	19500
20000	6.4094	3.69750	26.9700	5.91511	99.1325	3.60796	5.91511	3.60796	5.91511	20000
20500	6.6056	3.79430	27.0418	5.93309	99.1411	3.60776	5.93309	3.60776	5.93309	20500
21000	6.8131	3.89840	27.1110	5.95094	99.1499	3.60756	5.95094	3.60756	5.95094	21000
21500	7.0325	4.01030	27.1776	5.96866	99.1589	3.60736	5.96866	3.60736	5.96866	21500
22000	7.2644	4.12960	27.2416	5.98625	99.1681	3.60716	5.98625	3.60716	5.98625	22000
22500	7.5094	4.25580	27.3030	5.99372	99.1775	3.60696	5.99372	3.60696	5.99372	22500
23000	7.7681	4.38950	27.3628	6.00107	99.1871	3.60676	6.00107	3.60676	6.00107	23000
23500	8.0409	4.53120	27.4200	6.00829	99.1969	3.60656	6.00829	3.60656	6.00829	23500
24000	8.3283	4.68150	27.4746	6.01538	99.2069	3.60636	6.01538	3.60636	6.01538	24000
24500	8.6311	4.84010	27.5266	6.02234	99.2171	3.60616	6.02234	3.60616	6.02234	24500
25000	8.9499	5.00770	27.5760	6.02917	99.2275	3.60596	6.02917	3.60596	6.02917	25000
25500	9.2853	5.18490	27.6238	6.03587	99.2381	3.60576	6.03587	3.60576	6.03587	25500
26000	9.6381	5.37230	27.6690	6.04244	99.2489	3.60556	6.04244	3.60556	6.04244	26000
26500	10.0091	5.57050	27.7116	6.04888	99.2599	3.60536	6.04888	3.60536	6.04888	26500
27000	10.4000	5.78030	27.7516	6.05519	99.2711	3.60516	6.05519	3.60516	6.05519	27000
27500	10.8125	6.00250	27.7890	6.06137	99.2825	3.60496	6.06137	3.60496	6.06137	27500
28000	11.2475	6.23770	27.8238	6.06742	99.2941	3.60476	6.06742	3.60476	6.06742	28000
28500	11.7059	6.48680	27.8560	6.07334	99.3059	3.60456	6.07334	3.60456	6.07334	28500
29000	12.1887	6.75050	27.8856	6.07913	99.3179	3.60436	6.07913	3.60436	6.07913	29000
29500	12.6969	7.02960	27.9126	6.08479	99.3301	3.60416	6.08479	3.60416	6.08479	29500
30000	13.2315	7.32500	27.9370	6.09032	99.3425	3.60396	6.09032	3.60396	6.09032	30000

TABLE 10. IDEAL GAS FUNCTIONS FOR AR* (ATOMIC WEIGHT 39.9470, R = 1.00717 CAL/MOLE)

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N. 4. SEE TABLE 5A FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2}{8\pi^2 I}$	$-\frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0}$	5θ	$10^6 - \frac{5\theta}{I} - \frac{10^6 - 5\theta}{I_0}$	$\frac{5^2}{I} - \frac{5^2}{I_0}$	$\frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0} - \frac{h^2}{8\pi^2 I_1}$	$-(1^2 - \frac{1}{I_1})$	TEMP. (°K)
1000	4.2548	2.62339	20.5038	21.2072	5.21312	40.9034	3.22086 03	4.89086 04	1000
1200	4.3592	2.64149	21.0639	23.7053	5.24307	41.8074	3.91438 03	5.02796 04	1200
1400	4.4591	2.65152	21.4719	26.1234	5.26900	42.6442	4.59444 03	5.07206 04	1400
1600	4.5518	2.65611	21.8263	28.4824	5.29182	43.3755	5.26856 03	4.99946 04	1600
1800	4.6367	2.65717	22.1392	30.7964	5.30824	43.9943	5.92756 03	7.91902 04	1800
2000	4.7139	2.65681	22.4191	33.0752	5.31794	44.5595	6.58195 03	8.91806 04	2000
2200	4.7846	2.65547	22.6722	35.3257	5.32289	45.0534	7.22806 03	9.91176 04	2200
2400	4.8476	2.65311	22.9029	37.5530	5.32420	45.5119	7.86976 03	1.09226 05	2400
2600	4.9055	2.64927	23.1169	39.7612	5.32354	45.9331	8.50957 03	1.19436 05	2600
2800	4.9582	2.64421	23.3189	41.9531	5.32050	46.3225	9.13736 03	1.29776 05	2800
3000	5.0064	2.63806	23.4950	44.1311	5.31526	46.6845	9.76036 03	1.40086 05	3000
3200	5.0505	2.63092	23.6437	46.2971	5.30804	47.0226	1.03906 04	1.50476 05	3200
3400	5.0911	2.62287	23.8227	48.4526	5.29909	47.3394	1.10126 04	1.60906 05	3400
3600	5.1284	2.61393	23.9729	50.5980	5.28868	47.6381	1.16336 04	1.71306 05	3600
3800	5.1629	2.60413	24.1149	52.7369	5.27686	47.9200	1.22046 04	1.82106 05	3800
4000	5.1949	2.61048	24.2492	54.8677	5.26335	48.1871	1.28036 04	1.92796 05	4000
4200	5.2246	2.61498	24.3768	56.9918	5.24844	48.4400	1.34196 04	2.03496 05	4200
4400	5.2522	2.61864	24.4984	59.1101	5.23239	48.6824	1.40496 04	2.14306 05	4400
4600	5.2779	2.62045	24.6144	61.2229	5.21542	48.9130	1.47036 04	2.25006 05	4600
4800	5.3020	2.62041	24.7254	63.3306	5.19730	49.1334	1.53816 04	2.35606 05	4800
5000	5.3246	2.62051	24.8317	65.4342	5.17816	49.3447	1.60826 04	2.46206 05	5000
5200	5.3457	2.61974	24.9337	67.5334	5.15812	49.5474	1.68046 04	2.56806 05	5200
5400	5.3654	2.61811	25.0316	69.6289	5.13808	49.7423	1.75486 04	2.67406 05	5400
5600	5.3835	2.61559	25.1262	71.7206	5.11804	49.9299	1.83146 04	2.78006 05	5600
5800	5.4020	2.61220	25.2172	73.8094	5.09800	50.1107	1.91046 04	2.88606 05	5800
6000	5.4187	2.60891	25.3050	75.8949	5.07807	50.2613	1.99146 04	3.00706 05	6000
6200	5.4345	2.60572	25.3899	77.9776	5.05823	50.4539	2.07446 04	3.12806 05	6200
6400	5.4495	2.60263	25.4720	79.0577	5.03857	50.6171	2.15946 04	3.24906 05	6400
6600	5.4637	2.60063	25.5516	80.1352	5.01910	50.7752	2.24646 04	3.37006 05	6600
6800	5.4772	2.59872	25.6287	81.2104	5.00000	50.9284	2.33546 04	3.49106 05	6800
7000	5.4901	2.59699	25.7035	82.2834	5.12666	51.0771	2.42746 04	3.61206 05	7000
7200	5.5023	2.59513	25.7761	83.3563	5.12317	51.2214	2.52146 04	3.73306 05	7200
7400	5.5139	2.59345	25.8467	84.4232	5.11983	51.3618	2.61746 04	3.85406 05	7400
7600	5.5251	2.59188	25.9154	85.4903	5.11664	51.4982	2.71546 04	3.97506 05	7600
7800	5.5357	2.59038	25.9823	86.5596	5.11353	51.6311	2.81546 04	4.09606 05	7800
8000	5.5459	2.58779	26.0474	87.6192	5.11057	51.7605	2.91746 04	4.21706 05	8000
8200	5.5556	2.58534	26.1109	88.6813	5.10772	51.8867	3.02146 04	4.33806 05	8200
8400	5.5650	2.58290	26.1728	89.7418	5.10498	52.0097	3.12746 04	4.45906 05	8400
8600	5.5739	2.58065	26.2333	90.8009	5.10234	52.1298	3.23546 04	4.58006 05	8600
8800	5.5825	2.57847	26.2923	91.8587	5.09980	52.2471	3.34546 04	4.70106 05	8800
9000	5.5908	2.57634	26.3499	92.9151	5.09735	52.3617	3.45746 04	4.82206 05	9000
9200	5.5987	2.57425	26.4063	93.9703	5.09499	52.4737	3.57146 04	4.94306 05	9200
9400	5.6063	2.57220	26.4614	95.0252	5.09271	52.5833	3.68746 04	5.06406 05	9400
9600	5.6137	2.57019	26.5154	96.0800	5.09051	52.6904	3.80546 04	5.18506 05	9600
9800	5.6208	2.56822	26.5682	97.1348	5.08836	52.7954	3.92546 04	5.30606 05	9800
10000	5.6276	2.56629	26.6202	98.1896	5.08626	52.8994	4.04746 04	5.42706 05	10000

TABLE 10 (CONT.). THERMAL GAS FUNCTIONS FOR AIR

THERM. (°F.)	PRST PSIA	$\frac{U^*}{T}$	$-\frac{U^*}{T^2}$	$\ln \frac{U^*}{T}$	$-\ln \frac{U^*}{T}$	$\ln \frac{U^*}{T}$	$\ln \frac{U^*}{T}$	$\ln \frac{U^*}{T}$	$\ln \frac{U^*}{T}$	THERM. (°F.)
10000	5.6276	2.59999	26.6199	29.1795	5.06433	52.0902	57.0045	3.49925	5.06433	10000
10500	5.6437	2.59713	26.7647	29.3019	5.06148	52.1442	57.2277	3.24908	5.06148	10500
11000	5.6594	2.59400	26.9036	29.4195	5.05792	52.2025	57.3625	3.00000	5.05792	11000
11500	5.6749	2.59063	27.0372	29.5330	5.05461	52.2641	57.4961	2.75200	5.05461	11500
12000	5.6903	2.58709	27.1658	29.6437	5.05157	52.3295	57.6285	2.50500	5.05157	12000
12500	5.7056	2.58339	27.2899	29.7519	5.04879	52.3987	57.7607	2.25900	5.04879	12500
13000	5.7207	2.57955	27.4099	29.8577	5.04625	52.4717	57.8927	2.01400	5.04625	13000
13500	5.7357	2.57558	27.5261	29.9611	5.04394	52.5484	58.0237	1.77000	5.04394	13500
14000	5.7506	2.57149	27.6387	30.0621	5.04185	52.6287	58.1537	1.52700	5.04185	14000
14500	5.7654	2.56729	27.7477	30.1607	5.03997	52.7127	58.2827	1.28500	5.03997	14500
15000	5.7801	2.56299	27.8533	30.2570	5.03829	52.8002	58.4107	1.04400	5.03829	15000
15500	5.7947	2.55859	27.9565	30.3511	5.03681	52.8912	58.5377	0.80400	5.03681	15500
16000	5.8092	2.55409	28.0573	30.4431	5.03552	52.9857	58.6637	0.56500	5.03552	16000
16500	5.8237	2.54950	28.1557	30.5331	5.03441	53.0837	58.7887	0.32700	5.03441	16500
17000	5.8381	2.54481	28.2517	30.6211	5.03347	53.1852	58.9127	0.09000	5.03347	17000
17500	5.8524	2.54003	28.3453	30.7071	5.03269	53.2902	59.0357	0.00000	5.03269	17500
18000	5.8667	2.53516	28.4367	30.7911	5.03206	53.3987	59.1577	0.00000	5.03206	18000
18500	5.8809	2.53021	28.5257	30.8731	5.03157	53.5107	59.2787	0.00000	5.03157	18500
19000	5.8951	2.52518	28.6123	30.9531	5.03121	53.6262	59.3987	0.00000	5.03121	19000
19500	5.9092	2.52007	28.6967	31.0311	5.03097	53.7452	59.5167	0.00000	5.03097	19500
20000	5.9233	2.51488	28.7787	31.1071	5.03083	53.8677	59.6327	0.00000	5.03083	20000
20500	5.9374	2.50961	28.8587	31.1811	5.03080	53.9937	59.7467	0.00000	5.03080	20500
21000	5.9514	2.50426	28.9367	31.2531	5.03087	54.1232	59.8587	0.00000	5.03087	21000
21500	5.9654	2.49883	29.0127	31.3231	5.03103	54.2562	59.9687	0.00000	5.03103	21500
22000	5.9794	2.49332	29.0867	31.3911	5.03129	54.3927	60.0767	0.00000	5.03129	22000
22500	5.9933	2.48773	29.1587	31.4571	5.03165	54.5327	60.1827	0.00000	5.03165	22500
23000	5.9977	2.48207	29.2287	31.5211	5.03211	54.6762	60.2867	0.00000	5.03211	23000
23500	6.0020	2.47634	29.2967	31.5831	5.03267	54.8232	60.3887	0.00000	5.03267	23500
24000	6.0062	2.47053	29.3627	31.6441	5.03333	54.9737	60.4887	0.00000	5.03333	24000
24500	6.0104	2.46464	29.4267	31.7031	5.03409	55.1277	60.5867	0.00000	5.03409	24500
25000	6.0145	2.45867	29.4887	31.7601	5.03495	55.2852	60.6827	0.00000	5.03495	25000
25500	6.0186	2.45263	29.5487	31.8161	5.03591	55.4462	60.7767	0.00000	5.03591	25500
26000	6.0226	2.44651	29.6067	31.8711	5.03697	55.6107	60.8687	0.00000	5.03697	26000
26500	6.0266	2.44032	29.6627	31.9251	5.03813	55.7787	60.9587	0.00000	5.03813	26500
27000	6.0305	2.43406	29.7167	31.9781	5.03939	55.9502	61.0467	0.00000	5.03939	27000
27500	6.0344	2.42773	29.7687	32.0301	5.04075	56.1252	61.1327	0.00000	5.04075	27500
28000	6.0383	2.42133	29.8187	32.0811	5.04221	56.3037	61.2167	0.00000	5.04221	28000
28500	6.0421	2.41487	29.8667	32.1311	5.04377	56.4857	61.2987	0.00000	5.04377	28500
29000	6.0459	2.40834	29.9127	32.1801	5.04543	56.6712	61.3787	0.00000	5.04543	29000
29500	6.0496	2.40175	29.9567	32.2281	5.04719	56.8602	61.4567	0.00000	5.04719	29500
30000	6.0533	2.39511	29.9987	32.2751	5.04905	57.0527	61.5327	0.00000	5.04905	30000
30500	6.0569	2.38842	30.0387	32.3211	5.05099	57.2477	61.6067	0.00000	5.05099	30500
31000	6.0605	2.38168	30.0767	32.3661	5.05301	57.4452	61.6787	0.00000	5.05301	31000
31500	6.0641	2.37489	30.1127	32.4101	5.05511	57.6452	61.7487	0.00000	5.05511	31500
32000	6.0676	2.36805	30.1467	32.4531	5.05729	57.8487	61.8167	0.00000	5.05729	32000
32500	6.0711	2.36117	30.1787	32.4951	5.05955	58.0552	61.8827	0.00000	5.05955	32500
33000	6.0746	2.35424	30.2097	32.5361	5.06189	58.2647	61.9467	0.00000	5.06189	33000
33500	6.0780	2.34727	30.2397	32.5761	5.06431	58.4772	62.0087	0.00000	5.06431	33500
34000	6.0814	2.34025	30.2687	32.6151	5.06681	58.6927	62.0687	0.00000	5.06681	34000
34500	6.0848	2.33318	30.2967	32.6531	5.06939	58.9112	62.1267	0.00000	5.06939	34500
35000	6.0881	2.32607	30.3237	32.6901	5.07205	59.1327	62.1827	0.00000	5.07205	35000
35500	6.0914	2.31891	30.3497	32.7261	5.07479	59.3572	62.2367	0.00000	5.07479	35500
36000	6.0947	2.31171	30.3747	32.7611	5.07761	59.5847	62.2887	0.00000	5.07761	36000
36500	6.0979	2.30447	30.3987	32.7951	5.08051	59.8152	62.3387	0.00000	5.08051	36500
37000	6.1011	2.29719	30.4217	32.8281	5.08349	60.0487	62.3867	0.00000	5.08349	37000
37500	6.1043	2.28987	30.4437	32.8601	5.08655	60.2852	62.4327	0.00000	5.08655	37500
38000	6.1075	2.28251	30.4647	32.8911	5.08969	60.5247	62.4767	0.00000	5.08969	38000
38500	6.1107	2.27511	30.4847	32.9211	5.09291	60.7672	62.5187	0.00000	5.09291	38500
39000	6.1138	2.26767	30.5037	32.9501	5.09621	61.0127	62.5587	0.00000	5.09621	39000
39500	6.1169	2.26019	30.5217	32.9781	5.09959	61.2602	62.5967	0.00000	5.09959	39500
40000	6.1200	2.25267	30.5387	33.0051	5.10305	61.5107	62.6327	0.00000	5.10305	40000
40500	6.1231	2.24511	30.5547	33.0311	5.10659	61.7642	62.6667	0.00000	5.10659	40500
41000	6.1262	2.23751	30.5697	33.0561	5.11021	62.0207	62.6987	0.00000	5.11021	41000
41500	6.1293	2.22987	30.5837	33.0801	5.11391	62.2792	62.7287	0.00000	5.11391	41500
42000	6.1324	2.22219	30.5967	33.1031	5.11769	62.5407	62.7567	0.00000	5.11769	42000
42500	6.1355	2.21447	30.6087	33.1251	5.12155	62.8042	62.7827	0.00000	5.12155	42500
43000	6.1386	2.20671	30.6197	33.1471	5.12549	63.0707	62.8067	0.00000	5.12549	43000
43500	6.1417	2.19891	30.6297	33.1681	5.12951	63.3392	62.8287	0.00000	5.12951	43500
44000	6.1448	2.19107	30.6387	33.1881	5.13361	63.6107	62.8487	0.00000	5.13361	44000
44500	6.1479	2.18319	30.6467	33.2071	5.13779	63.8842	62.8667	0.00000	5.13779	44500
45000	6.1510	2.17527	30.6537	33.2251	5.14205	64.1607	62.8827	0.00000	5.14205	45000
45500	6.1541	2.16731	30.6597	33.2421	5.14639	64.4392	62.8967	0.00000	5.14639	45500
46000	6.1572	2.15931	30.6647	33.2581	5.15081	64.7207	62.9087	0.00000	5.15081	46000
46500	6.1603	2.15127	30.6687	33.2731	5.15531	65.0042	62.9187	0.00000	5.15531	46500
47000	6.1634	2.14319	30.6717	33.2871	5.15989	65.2907	62.9267	0.00000	5.15989	47000
47500	6.1665	2.13507	30.6737	33.3001	5.16455	65.5792	62.9327	0.00000	5.16455	47500
48000	6.1696	2.12691	30.6747	33.3121	5.16929	65.8707	62.9367	0.00000	5.16929	48000
48500	6.1727	2.11871	30.6747	33.3231	5.17411	66.1642	62.9387	0.00000	5.17411	48500
49000	6.1758	2.11047	30.6737	33.3341	5.17899	66.4607	62.9387	0.00000	5.17899	49000
49500	6.1789	2.10219	30.6717	33.3441	5.18393	66.7602	62.9367	0.00000	5.18393	49500
50000	6.1820	2.09387	30.6687	33.3531	5.18893	67.0627	62.9327	0.00000	5.18893	50000

TABLE 11. IDEAL GAS FUNCTIONS FOR C ++ (ATOMIC WEIGHT 12.0101, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 55 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{8\pi^2 I}$	$\frac{h^2}{8\pi^2 I} - \frac{F_0}{N_A}$	\ln	$10^3 \cdot \frac{h^2}{8\pi^2 I} - 10^3 \cdot \frac{F_0}{N_A}$	$\frac{F_0}{N_A}$	e^{-F_0/N_A}	$\frac{N^2}{CAL/MOLE}$	$-(F_0 - F_N)$	TEMP. (°K)
3000	1.0000	2.50000	20.8706	22.5706	4.94791	39.9014	44.8494	0.94226	0.19706	3000
3200	1.0000	2.50000	20.8706	22.5706	4.94791	40.2221	45.1900	0.93646	0.19706	3200
3400	1.0000	2.50000	20.8706	22.5706	4.94791	40.5432	45.5312	0.93054	0.19706	3400
3600	1.0000	2.50000	20.8706	22.5706	4.94791	40.8642	45.8720	0.92462	0.19706	3600
3800	1.0000	2.50000	20.8706	22.5706	4.94791	41.1852	46.2128	0.91870	0.19706	3800
4000	1.0000	2.50000	20.8706	22.5706	4.94791	41.5062	46.5536	0.91278	0.19706	4000
4200	1.0000	2.50000	20.8706	22.5706	4.94791	41.8272	46.8944	0.90686	0.19706	4200
4400	1.0000	2.50000	20.8706	22.5706	4.94791	42.1482	47.2352	0.90094	0.19706	4400
4600	1.0000	2.50000	20.8706	22.5706	4.94791	42.4692	47.5760	0.89502	0.19706	4600
4800	1.0000	2.50000	20.8706	22.5706	4.94791	42.7902	47.9168	0.88910	0.19706	4800
5000	1.0000	2.50000	20.8706	22.5706	4.94791	43.1112	48.2576	0.88318	0.19706	5000
5200	1.0000	2.50000	20.8706	22.5706	4.94791	43.4322	48.5984	0.87726	0.19706	5200
5400	1.0000	2.50000	20.8706	22.5706	4.94791	43.7532	48.9392	0.87134	0.19706	5400
5600	1.0000	2.50000	20.8706	22.5706	4.94791	44.0742	49.2800	0.86542	0.19706	5600
5800	1.0000	2.50000	20.8706	22.5706	4.94791	44.3952	49.6208	0.85950	0.19706	5800
6000	1.0000	2.50000	20.8706	22.5706	4.94791	44.7162	49.9616	0.85358	0.19706	6000
6200	1.0000	2.50000	20.8706	22.5706	4.94791	45.0372	50.3024	0.84766	0.19706	6200
6400	1.0000	2.50000	20.8706	22.5706	4.94791	45.3582	50.6432	0.84174	0.19706	6400
6600	1.0000	2.50000	20.8706	22.5706	4.94791	45.6792	50.9840	0.83582	0.19706	6600
6800	1.0000	2.50000	20.8706	22.5706	4.94791	45.9999	51.3248	0.82990	0.19706	6800
7000	1.0000	2.50000	20.8706	22.5706	4.94791	46.3209	51.6656	0.82398	0.19706	7000
7200	1.0000	2.50000	20.8706	22.5706	4.94791	46.6419	52.0064	0.81806	0.19706	7200
7400	1.0000	2.50000	20.8706	22.5706	4.94791	46.9629	52.3472	0.81214	0.19706	7400
7600	1.0000	2.50000	20.8706	22.5706	4.94791	47.2839	52.6880	0.80622	0.19706	7600
7800	1.0000	2.50000	20.8706	22.5706	4.94791	47.6049	53.0288	0.80030	0.19706	7800
8000	1.0000	2.50000	20.8706	22.5706	4.94791	47.9259	53.3696	0.79438	0.19706	8000
8200	1.0000	2.50000	20.8706	22.5706	4.94791	48.2469	53.7104	0.78846	0.19706	8200
8400	1.0000	2.50000	20.8706	22.5706	4.94791	48.5679	54.0512	0.78254	0.19706	8400
8600	1.0000	2.50000	20.8706	22.5706	4.94791	48.8889	54.3920	0.77662	0.19706	8600
8800	1.0000	2.50000	20.8706	22.5706	4.94791	49.2099	54.7328	0.77070	0.19706	8800
9000	1.0000	2.50000	20.8706	22.5706	4.94791	49.5309	55.0736	0.76478	0.19706	9000
9200	1.0000	2.50000	20.8706	22.5706	4.94791	49.8519	55.4144	0.75886	0.19706	9200
9400	1.0000	2.50000	20.8706	22.5706	4.94791	50.1729	55.7552	0.75294	0.19706	9400
9600	1.0000	2.50000	20.8706	22.5706	4.94791	50.4939	56.0960	0.74702	0.19706	9600
9800	1.0000	2.50000	20.8706	22.5706	4.94791	50.8149	56.4368	0.74110	0.19706	9800
10000	1.0000	2.50000	20.8706	22.5706	4.94791	51.1359	56.7776	0.73518	0.19706	10000
10500	1.0000	2.50000	20.8706	22.5706	4.94791	51.8169	57.4586	0.72926	0.19706	10500
11000	1.0000	2.50000	20.8706	22.5706	4.94791	52.4979	58.1396	0.72334	0.19706	11000
11500	1.0000	2.50000	20.8706	22.5706	4.94791	53.1789	58.8206	0.71742	0.19706	11500
12000	1.0000	2.50000	20.8706	22.5706	4.94791	53.8599	59.5016	0.71150	0.19706	12000
12500	1.0000	2.50000	20.8706	22.5706	4.94791	54.5409	60.1826	0.70558	0.19706	12500
13000	1.0000	2.50000	20.8706	22.5706	4.94791	55.2219	60.8636	0.69966	0.19706	13000
13500	1.0000	2.50000	20.8706	22.5706	4.94791	55.9029	61.5446	0.69374	0.19706	13500
14000	1.0000	2.50000	20.8706	22.5706	4.94791	56.5839	62.2256	0.68782	0.19706	14000
14500	1.0000	2.50000	20.8706	22.5706	4.94791	57.2649	62.9066	0.68190	0.19706	14500

TABLE 11 (CONT.). IDEAL GAS FUNCTIONS FOR C

TEMP. (°K)	PARTIAL PRESS.	$\frac{V}{RT} - \frac{P}{RT^2}$	$\ln \frac{V}{RT} - \frac{P}{RT^2}$	$\ln \frac{V}{RT} - \frac{P}{RT^2}$	$\ln \frac{V}{RT} - \frac{P}{RT^2}$	$\ln \frac{V}{RT} - \frac{P}{RT^2}$	$\ln \frac{V}{RT} - \frac{P}{RT^2}$	TEMP. (°K)
15000	1.0992	2.78171	24.1600	26.9423	5.52771	46.0112	53.5309	15000
15500	1.0696	2.81767	24.2524	27.0793	5.59957	46.1936	53.7932	15500
16000	1.0411	2.85817	24.3425	27.1977	5.67349	46.3726	54.0462	16000
16500	1.0136	2.89332	24.4309	27.3243	5.74991	46.5483	54.2978	16500
17000	1.1072	2.93205	24.5179	27.4499	5.82846	46.7211	54.5475	17000
17500	1.1217	2.97107	24.6034	27.5745	5.90900	46.8911	54.7951	17500
18000	1.1374	3.01014	24.6877	27.6976	5.99164	47.0589	55.0401	18000
18500	1.1540	3.04943	24.7707	27.8197	6.07692	47.2234	55.2824	18500
19000	1.1716	3.08792	24.8525	27.9406	6.16494	47.3849	55.5215	19000
19500	1.1902	3.12562	24.9332	28.0606	6.25564	47.5434	55.7571	19500
20000	1.2090	3.16299	25.0128	28.1794	6.34909	47.7000	55.9892	20000
20500	1.2272	3.20136	25.0913	28.2971	6.44535	47.8546	56.2186	20500
21000	1.2458	3.23989	25.1683	28.4133	6.54454	48.0074	56.4452	21000
21500	1.2648	3.27856	25.2438	28.5282	6.64669	48.1584	56.6697	21500
22000	1.2842	3.31737	25.3178	28.6418	6.75184	48.3076	56.8919	22000
22500	1.3040	3.35632	25.3903	28.7541	6.85994	48.4550	57.1118	22500
23000	1.3242	3.39541	25.4613	28.8651	6.97094	48.6006	57.3294	23000
23500	1.3448	3.43464	25.5308	28.9748	7.08489	48.7444	57.5447	23500
24000	1.3658	3.47401	25.6000	29.0832	7.20174	48.8864	57.7578	24000
24500	1.3872	3.51351	25.6678	29.1903	7.32144	49.0266	57.9687	24500
25000	1.4090	3.55314	25.7352	29.2960	7.44394	49.1650	58.1774	25000
25500	1.4312	3.59290	25.8013	29.4003	7.56919	49.3016	58.3839	25500
26000	1.4538	3.63279	25.8660	29.5032	7.69714	49.4364	58.5882	26000
26500	1.4768	3.67280	25.9293	29.6047	7.82774	49.5694	58.7903	26500
27000	1.4992	3.71293	25.9913	29.7048	7.96094	49.7006	58.9902	27000
27500	1.5219	3.75318	26.0519	29.8035	8.09669	49.8299	59.1879	27500
28000	1.5449	3.79355	26.1111	29.9008	8.23494	49.9574	59.3832	28000
28500	1.5682	3.83403	26.1688	30.0000	8.37564	50.0831	59.5761	28500
29000	1.5918	3.87462	26.2250	30.1000	8.51874	50.2069	59.7666	29000
29500	1.6157	3.91531	26.2797	30.2000	8.66419	50.3289	59.9547	29500
30000	1.6399	3.95610	26.3329	30.3000	8.81194	50.4490	60.1404	30000
30500	1.6644	3.99700	26.3846	30.4000	8.96194	50.5673	60.3237	30500
31000	1.6892	4.03800	26.4348	30.5000	9.11414	50.6839	60.5047	31000
31500	1.7142	4.07910	26.4835	30.6000	9.26849	50.7987	60.6832	31500
32000	1.7395	4.12030	26.5307	30.7000	9.42494	50.9117	60.8592	32000
32500	1.7651	4.16160	26.5764	30.8000	9.58344	51.0229	61.0327	32500
33000	1.7909	4.20300	26.6206	30.9000	9.74394	51.1324	61.2037	33000
33500	1.8169	4.24450	26.6633	31.0000	9.90644	51.2401	61.3722	33500
34000	1.8431	4.28610	26.7045	31.1000	10.07094	51.3460	61.5382	34000
34500	1.8695	4.32780	26.7441	31.2000	10.23744	51.4501	61.7017	34500
35000	1.8961	4.36960	26.7822	31.3000	10.40594	51.5524	61.8627	35000
35500	1.9229	4.41150	26.8188	31.4000	10.57644	51.6529	62.0212	35500
36000	1.9498	4.45350	26.8539	31.5000	10.74894	51.7516	62.1772	36000
36500	1.9769	4.49560	26.8875	31.6000	10.92344	51.8486	62.3307	36500
37000	1.9992	4.53780	26.9196	31.7000	11.09994	51.9439	62.4817	37000
37500	2.0217	4.58010	26.9501	31.8000	11.27844	52.0374	62.6302	37500
38000	2.0444	4.62250	26.9791	31.9000	11.45894	52.1291	62.7762	38000
38500	2.0672	4.66500	27.0066	32.0000	11.64144	52.2190	62.9197	38500
39000	2.0901	4.70760	27.0326	32.1000	11.82594	52.3071	63.0607	39000
39500	2.1131	4.75030	27.0571	32.2000	12.01244	52.3934	63.1992	39500
40000	2.1362	4.79310	27.0801	32.3000	12.20094	52.4779	63.3352	40000
40500	2.1594	4.83600	27.1016	32.4000	12.39144	52.5606	63.4687	40500
41000	2.1827	4.87900	27.1216	32.5000	12.58394	52.6415	63.5997	41000
41500	2.2061	4.92210	27.1401	32.6000	12.77844	52.7206	63.7282	41500
42000	2.2296	4.96530	27.1571	32.7000	12.97494	52.7979	63.8542	42000
42500	2.2532	5.00860	27.1726	32.8000	13.17344	52.8734	63.9777	42500
43000	2.2769	5.05200	27.1866	32.9000	13.37394	52.9471	64.0987	43000
43500	2.2997	5.09550	27.1991	33.0000	13.57644	53.0190	64.2172	43500
44000	2.3226	5.13910	27.2101	33.1000	13.78094	53.0891	64.3332	44000
44500	2.3456	5.18280	27.2196	33.2000	13.98744	53.1574	64.4467	44500
45000	2.3687	5.22660	27.2276	33.3000	14.19594	53.2239	64.5577	45000
45500	2.3919	5.27050	27.2341	33.4000	14.40644	53.2886	64.6662	45500
46000	2.4152	5.31450	27.2391	33.5000	14.61894	53.3515	64.7722	46000
46500	2.4386	5.35860	27.2426	33.6000	14.83344	53.4126	64.8757	46500
47000	2.4621	5.40280	27.2446	33.7000	15.04994	53.4719	64.9767	47000
47500	2.4857	5.44710	27.2451	33.8000	15.26844	53.5294	65.0752	47500
48000	2.5094	5.49150	27.2441	33.9000	15.48894	53.5851	65.1712	48000
48500	2.5332	5.53600	27.2416	34.0000	15.71144	53.6389	65.2647	48500
49000	2.5571	5.58060	27.2376	34.1000	15.93594	53.6909	65.3557	49000
49500	2.5811	5.62530	27.2321	34.2000	16.16244	53.7410	65.4442	49500
50000	2.6052	5.67010	27.2251	34.3000	16.39094	53.7892	65.5302	50000
50500	2.6294	5.71500	27.2166	34.4000	16.62144	53.8355	65.6137	50500
51000	2.6537	5.76000	27.2066	34.5000	16.85394	53.8799	65.6947	51000
51500	2.6781	5.80510	27.1951	34.6000	17.08844	53.9224	65.7732	51500
52000	2.7026	5.85030	27.1821	34.7000	17.32494	53.9630	65.8492	52000
52500	2.7272	5.89560	27.1676	34.8000	17.56344	54.0017	65.9227	52500
53000	2.7519	5.94100	27.1516	34.9000	17.80394	54.0386	65.9937	53000
53500	2.7767	5.98650	27.1341	35.0000	18.04644	54.0737	66.0622	53500
54000	2.8016	6.03210	27.1151	35.1000	18.29094	54.1069	66.1282	54000
54500	2.8266	6.07780	27.0946	35.2000	18.53744	54.1382	66.1917	54500
55000	2.8517	6.12360	27.0726	35.3000	18.78594	54.1677	66.2527	55000
55500	2.8769	6.16950	27.0491	35.4000	19.03644	54.1954	66.3112	55500
56000	2.9022	6.21550	27.0241	35.5000	19.28894	54.2213	66.3672	56000
56500	2.9276	6.26160	27.0000	35.6000	19.54344	54.2454	66.4207	56500
57000	2.9531	6.30780	26.9736	35.7000	19.79994	54.2677	66.4717	57000
57500	2.9787	6.35410	26.9451	35.8000	20.05844	54.2882	66.5202	57500
58000	3.0044	6.40050	26.9146	35.9000	20.31894	54.3069	66.5662	58000
58500	3.0302	6.44700	26.8821	36.0000	20.58144	54.3239	66.6097	58500
59000	3.0561	6.49360	26.8476	36.1000	20.84594	54.3392	66.6507	59000
59500	3.0821	6.54030	26.8111	36.2000	21.11244	54.3527	66.6892	59500
60000	3.1082	6.58710	26.7726	36.3000	21.38094	54.3644	66.7252	60000

TABLE 12. IDEAL GAS FUNCTIONS FOR H_2 (ATOMIC WEIGHT 1.00794, $R = 1.98717$ CAL/MOLE)

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 54 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL PRESS.	$\frac{U^0 - U}{RT}$	$\frac{H^0 - H}{RT}$	$\frac{S^0 - S}{R}$	$\ln \frac{U^0 - U}{RT} - \frac{H^0 - H}{RT}$	$\frac{S^0 - S}{R}$	$\frac{U^0 - U}{RT} - \frac{H^0 - H}{RT}$	$\frac{U^0 - U}{RT} - \frac{H^0 - H}{RT}$	TEMP. (°K)
3000	5.6789	2.55422	22.0469	24.6811	5.07565	43.0108	48.0865	9.24545	3000
3200	5.6982	2.55092	22.2116	24.7424	5.06910	44.0025	49.0682	9.24545	3200
3400	5.7151	2.54800	22.3462	24.7852	5.06336	44.4432	49.5089	9.24545	3400
3600	5.7305	2.54540	22.4518	24.8172	5.05813	44.7747	49.7927	9.24545	3600
3800	5.7443	2.54307	22.5343	24.8423	5.05339	45.0079	49.9614	9.24545	3800
4000	5.7566	2.54096	22.5997	24.8627	5.04931	45.1614	50.0364	9.24545	4000
4200	5.7679	2.53905	22.6506	24.8787	5.04581	45.2433	50.0950	9.24545	4200
4400	5.7781	2.53731	22.6877	24.8909	5.04286	45.2928	50.1409	9.24545	4400
4600	5.7875	2.53572	22.7135	24.9002	5.04039	45.3244	50.1766	9.24545	4600
4800	5.7962	2.53426	22.7324	24.9068	5.03839	45.3484	50.2054	9.24545	4800
5000	5.8041	2.53291	22.7459	24.9111	5.03684	45.3654	50.2284	9.24545	5000
5200	5.8115	2.53167	22.7545	24.9136	5.03572	45.3764	50.2464	9.24545	5200
5400	5.8183	2.53052	22.7592	24.9151	5.03504	45.3814	50.2594	9.24545	5400
5600	5.8246	2.52945	22.7612	24.9158	5.03479	45.3844	50.2684	9.24545	5600
5800	5.8305	2.52846	22.7614	24.9158	5.03447	45.3864	50.2744	9.24545	5800
6000	5.8360	2.52754	22.7607	24.9151	5.03409	45.3874	50.2784	9.24545	6000
6200	5.8413	2.52668	22.7592	24.9136	5.03364	45.3874	50.2804	9.24545	6200
6400	5.8462	2.52588	22.7569	24.9111	5.03314	45.3864	50.2804	9.24545	6400
6600	5.8507	2.52513	22.7539	24.9079	5.03264	45.3844	50.2784	9.24545	6600
6800	5.8551	2.52444	22.7504	24.9047	5.03214	45.3814	50.2744	9.24545	6800
7000	5.8592	2.52381	22.7464	24.9011	5.03164	45.3774	50.2684	9.24545	7000
7200	5.8630	2.52325	22.7419	24.8971	5.03114	45.3724	50.2604	9.24545	7200
7400	5.8667	2.52276	22.7369	24.8929	5.03064	45.3664	50.2514	9.24545	7400
7600	5.8703	2.52231	22.7314	24.8884	5.03014	45.3594	50.2414	9.24545	7600
7800	5.8736	2.52178	22.7254	24.8836	5.02964	45.3514	50.2304	9.24545	7800
8000	5.8768	2.52141	22.7189	24.8784	5.02914	45.3424	50.2184	9.24545	8000
8200	5.8799	2.52109	22.7119	24.8729	5.02864	45.3324	50.2054	9.24545	8200
8400	5.8829	2.52082	22.7044	24.8671	5.02814	45.3214	50.1914	9.24545	8400
8600	5.8857	2.52062	22.6964	24.8609	5.02764	45.3094	50.1764	9.24545	8600
8800	5.8885	2.52047	22.6879	24.8544	5.02714	45.2964	50.1604	9.24545	8800
9000	5.8912	2.52039	22.6789	24.8476	5.02664	45.2824	50.1434	9.24545	9000
9200	5.8939	2.52037	22.6694	24.8404	5.02614	45.2674	50.1254	9.24545	9200
9400	5.8964	2.52042	22.6594	24.8329	5.02564	45.2514	50.1064	9.24545	9400
9600	5.8989	2.52056	22.6489	24.8251	5.02514	45.2344	50.0864	9.24545	9600
9800	5.9015	2.52074	22.6374	24.8164	5.02464	45.2164	50.0654	9.24545	9800
10000	5.9040	2.52101	22.6257	24.8069	5.02414	45.1974	50.0434	9.24545	10000
10200	5.9064	2.52136	22.6137	24.7964	5.02364	45.1774	50.0204	9.24545	10200
10400	5.9088	2.52179	22.6014	24.7849	5.02314	45.1564	50.0004	9.24545	10400
10600	5.9112	2.52229	22.5889	24.7724	5.02264	45.1344	49.9784	9.24545	10600
10800	5.9136	2.52284	22.5764	24.7594	5.02214	45.1114	49.9544	9.24545	10800
11000	5.9159	2.52344	22.5639	24.7459	5.02164	45.0874	49.9284	9.24545	11000
11200	5.9182	2.52409	22.5514	24.7319	5.02114	45.0624	49.9004	9.24545	11200
11400	5.9205	2.52479	22.5389	24.7174	5.02064	45.0364	49.8704	9.24545	11400
11600	5.9227	2.52554	22.5264	24.7024	5.02014	45.0094	49.8384	9.24545	11600
11800	5.9249	2.52634	22.5139	24.6869	5.01964	44.9814	49.8044	9.24545	11800
12000	5.9270	2.52719	22.5014	24.6709	5.01914	44.9524	49.7684	9.24545	12000
12200	5.9291	2.52809	22.4889	24.6544	5.01864	44.9224	49.7304	9.24545	12200
12400	5.9311	2.52904	22.4764	24.6374	5.01814	44.8914	49.6904	9.24545	12400
12600	5.9330	2.53004	22.4639	24.6204	5.01764	44.8594	49.6484	9.24545	12600
12800	5.9348	2.53109	22.4514	24.6029	5.01714	44.8264	49.6044	9.24545	12800
13000	5.9366	2.53219	22.4389	24.5854	5.01664	44.7924	49.5584	9.24545	13000
13200	5.9383	2.53334	22.4264	24.5674	5.01614	44.7574	49.5104	9.24545	13200
13400	5.9399	2.53454	22.4139	24.5489	5.01564	44.7214	49.4604	9.24545	13400
13600	5.9415	2.53579	22.4014	24.5304	5.01514	44.6844	49.4084	9.24545	13600
13800	5.9430	2.53709	22.3889	24.5114	5.01464	44.6474	49.3544	9.24545	13800
14000	5.9445	2.53844	22.3764	24.4919	5.01414	44.6094	49.2984	9.24545	14000

TABLE 12 (CONT.). IDEAL GAS FUNCTIONS FOR H_2

TEMP. (°F)	PARTIAL PRESS.	$\frac{V}{V_0}$	$-\frac{V}{V_0} \frac{dV}{V}$	$\frac{dV}{V}$	$\frac{dV}{V_0}$	$-\frac{V}{V_0} \frac{dV}{V}$	$\frac{dV}{V_0}$	$\frac{d^2V}{dV^2}$	$\frac{d^3V}{dV^3}$	$\frac{d^4V}{dV^4}$	$\frac{d^5V}{dV^5}$	$\frac{d^6V}{dV^6}$	$\frac{d^7V}{dV^7}$	$\frac{d^8V}{dV^8}$	$\frac{d^9V}{dV^9}$	$\frac{d^{10}V}{dV^{10}}$	$\frac{d^{11}V}{dV^{11}}$	$\frac{d^{12}V}{dV^{12}}$	$\frac{d^{13}V}{dV^{13}}$	$\frac{d^{14}V}{dV^{14}}$	$\frac{d^{15}V}{dV^{15}}$	$\frac{d^{16}V}{dV^{16}}$	$\frac{d^{17}V}{dV^{17}}$	$\frac{d^{18}V}{dV^{18}}$	$\frac{d^{19}V}{dV^{19}}$	$\frac{d^{20}V}{dV^{20}}$	$\frac{d^{21}V}{dV^{21}}$	$\frac{d^{22}V}{dV^{22}}$	$\frac{d^{23}V}{dV^{23}}$	$\frac{d^{24}V}{dV^{24}}$	$\frac{d^{25}V}{dV^{25}}$	$\frac{d^{26}V}{dV^{26}}$	$\frac{d^{27}V}{dV^{27}}$	$\frac{d^{28}V}{dV^{28}}$	$\frac{d^{29}V}{dV^{29}}$	$\frac{d^{30}V}{dV^{30}}$	$\frac{d^{31}V}{dV^{31}}$	$\frac{d^{32}V}{dV^{32}}$	$\frac{d^{33}V}{dV^{33}}$	$\frac{d^{34}V}{dV^{34}}$	$\frac{d^{35}V}{dV^{35}}$	$\frac{d^{36}V}{dV^{36}}$	$\frac{d^{37}V}{dV^{37}}$	$\frac{d^{38}V}{dV^{38}}$	$\frac{d^{39}V}{dV^{39}}$	$\frac{d^{40}V}{dV^{40}}$	$\frac{d^{41}V}{dV^{41}}$	$\frac{d^{42}V}{dV^{42}}$	$\frac{d^{43}V}{dV^{43}}$	$\frac{d^{44}V}{dV^{44}}$	$\frac{d^{45}V}{dV^{45}}$	$\frac{d^{46}V}{dV^{46}}$	$\frac{d^{47}V}{dV^{47}}$	$\frac{d^{48}V}{dV^{48}}$	$\frac{d^{49}V}{dV^{49}}$	$\frac{d^{50}V}{dV^{50}}$	$\frac{d^{51}V}{dV^{51}}$	$\frac{d^{52}V}{dV^{52}}$	$\frac{d^{53}V}{dV^{53}}$	$\frac{d^{54}V}{dV^{54}}$	$\frac{d^{55}V}{dV^{55}}$	$\frac{d^{56}V}{dV^{56}}$	$\frac{d^{57}V}{dV^{57}}$	$\frac{d^{58}V}{dV^{58}}$	$\frac{d^{59}V}{dV^{59}}$	$\frac{d^{60}V}{dV^{60}}$	$\frac{d^{61}V}{dV^{61}}$	$\frac{d^{62}V}{dV^{62}}$	$\frac{d^{63}V}{dV^{63}}$	$\frac{d^{64}V}{dV^{64}}$	$\frac{d^{65}V}{dV^{65}}$	$\frac{d^{66}V}{dV^{66}}$	$\frac{d^{67}V}{dV^{67}}$	$\frac{d^{68}V}{dV^{68}}$	$\frac{d^{69}V}{dV^{69}}$	$\frac{d^{70}V}{dV^{70}}$	$\frac{d^{71}V}{dV^{71}}$	$\frac{d^{72}V}{dV^{72}}$	$\frac{d^{73}V}{dV^{73}}$	$\frac{d^{74}V}{dV^{74}}$	$\frac{d^{75}V}{dV^{75}}$	$\frac{d^{76}V}{dV^{76}}$	$\frac{d^{77}V}{dV^{77}}$	$\frac{d^{78}V}{dV^{78}}$	$\frac{d^{79}V}{dV^{79}}$	$\frac{d^{80}V}{dV^{80}}$	$\frac{d^{81}V}{dV^{81}}$	$\frac{d^{82}V}{dV^{82}}$	$\frac{d^{83}V}{dV^{83}}$	$\frac{d^{84}V}{dV^{84}}$	$\frac{d^{85}V}{dV^{85}}$	$\frac{d^{86}V}{dV^{86}}$	$\frac{d^{87}V}{dV^{87}}$	$\frac{d^{88}V}{dV^{88}}$	$\frac{d^{89}V}{dV^{89}}$	$\frac{d^{90}V}{dV^{90}}$	$\frac{d^{91}V}{dV^{91}}$	$\frac{d^{92}V}{dV^{92}}$	$\frac{d^{93}V}{dV^{93}}$	$\frac{d^{94}V}{dV^{94}}$	$\frac{d^{95}V}{dV^{95}}$	$\frac{d^{96}V}{dV^{96}}$	$\frac{d^{97}V}{dV^{97}}$	$\frac{d^{98}V}{dV^{98}}$	$\frac{d^{99}V}{dV^{99}}$	$\frac{d^{100}V}{dV^{100}}$	$\frac{d^{101}V}{dV^{101}}$	$\frac{d^{102}V}{dV^{102}}$	$\frac{d^{103}V}{dV^{103}}$	$\frac{d^{104}V}{dV^{104}}$	$\frac{d^{105}V}{dV^{105}}$	$\frac{d^{106}V}{dV^{106}}$	$\frac{d^{107}V}{dV^{107}}$	$\frac{d^{108}V}{dV^{108}}$	$\frac{d^{109}V}{dV^{109}}$	$\frac{d^{110}V}{dV^{110}}$	$\frac{d^{111}V}{dV^{111}}$	$\frac{d^{112}V}{dV^{112}}$	$\frac{d^{113}V}{dV^{113}}$	$\frac{d^{114}V}{dV^{114}}$	$\frac{d^{115}V}{dV^{115}}$	$\frac{d^{116}V}{dV^{116}}$	$\frac{d^{117}V}{dV^{117}}$	$\frac{d^{118}V}{dV^{118}}$	$\frac{d^{119}V}{dV^{119}}$	$\frac{d^{120}V}{dV^{120}}$	$\frac{d^{121}V}{dV^{121}}$	$\frac{d^{122}V}{dV^{122}}$	$\frac{d^{123}V}{dV^{123}}$	$\frac{d^{124}V}{dV^{124}}$	$\frac{d^{125}V}{dV^{125}}$	$\frac{d^{126}V}{dV^{126}}$	$\frac{d^{127}V}{dV^{127}}$	$\frac{d^{128}V}{dV^{128}}$	$\frac{d^{129}V}{dV^{129}}$	$\frac{d^{130}V}{dV^{130}}$	$\frac{d^{131}V}{dV^{131}}$	$\frac{d^{132}V}{dV^{132}}$	$\frac{d^{133}V}{dV^{133}}$	$\frac{d^{134}V}{dV^{134}}$	$\frac{d^{135}V}{dV^{135}}$	$\frac{d^{136}V}{dV^{136}}$	$\frac{d^{137}V}{dV^{137}}$	$\frac{d^{138}V}{dV^{138}}$	$\frac{d^{139}V}{dV^{139}}$	$\frac{d^{140}V}{dV^{140}}$	$\frac{d^{141}V}{dV^{141}}$	$\frac{d^{142}V}{dV^{142}}$	$\frac{d^{143}V}{dV^{143}}$	$\frac{d^{144}V}{dV^{144}}$	$\frac{d^{145}V}{dV^{145}}$	$\frac{d^{146}V}{dV^{146}}$	$\frac{d^{147}V}{dV^{147}}$	$\frac{d^{148}V}{dV^{148}}$	$\frac{d^{149}V}{dV^{149}}$	$\frac{d^{150}V}{dV^{150}}$	$\frac{d^{151}V}{dV^{151}}$	$\frac{d^{152}V}{dV^{152}}$	$\frac{d^{153}V}{dV^{153}}$	$\frac{d^{154}V}{dV^{154}}$	$\frac{d^{155}V}{dV^{155}}$	$\frac{d^{156}V}{dV^{156}}$	$\frac{d^{157}V}{dV^{157}}$	$\frac{d^{158}V}{dV^{158}}$	$\frac{d^{159}V}{dV^{159}}$	$\frac{d^{160}V}{dV^{160}}$	$\frac{d^{161}V}{dV^{161}}$	$\frac{d^{162}V}{dV^{162}}$	$\frac{d^{163}V}{dV^{163}}$	$\frac{d^{164}V}{dV^{164}}$	$\frac{d^{165}V}{dV^{165}}$	$\frac{d^{166}V}{dV^{166}}$	$\frac{d^{167}V}{dV^{167}}$	$\frac{d^{168}V}{dV^{168}}$
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TABLE 13. IDEAL GAS FUNCTIONS FOR O_2 (ATOMIC WEIGHT 15.9993, $R = 1.98717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 57 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCTION	$\frac{h^2}{8\pi^2 I}$	$-\frac{h^2}{8\pi^2 I}$	$5R$	$h^2 - \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0}$	$-\frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0} - \frac{h^2}{8\pi^2 I_1}$	$h^2 - \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0} - \frac{h^2}{8\pi^2 I_1} - \frac{h^2}{8\pi^2 I_2}$	$h^2 - \frac{h^2}{8\pi^2 I} - \frac{h^2}{8\pi^2 I_0} - \frac{h^2}{8\pi^2 I_1} - \frac{h^2}{8\pi^2 I_2} - \frac{h^2}{8\pi^2 I_3}$	TEMP. (°K)			
3000	0.1268	2.99726	32.4009	23.3980	9.16110	44.9248	50.0000	9.5221E 03	1.5404E 04	1.5404E 04	1.3478E 05	3000
3200	0.2043	2.59164	22.7759	23.3676	9.15001	45.2596	50.4896	1.0121E 04	1.4400E 04	1.4400E 04	1.4400E 05	3200
3400	0.2800	2.50679	22.9729	23.5197	9.14039	45.5713	50.7119	1.0721E 04	1.7477E 04	1.7477E 04	1.5494E 05	3400
3600	0.3500	2.50245	23.0006	25.4633	9.13215	45.8651	50.9972	1.1322E 04	1.8478E 04	1.8478E 04	1.6411E 05	3600
3800	0.3772	2.57914	23.2262	25.7993	9.12517	46.1423	51.2675	1.1924E 04	1.9478E 04	1.9478E 04	1.7334E 05	3800
4000	0.3404	2.57420	23.3324	27.9206	9.11934	46.4051	51.5244	1.2529E 04	2.0477E 04	2.0477E 04	1.8262E 05	4000
4200	0.3910	2.57300	23.4700	28.0510	9.11454	46.6547	51.7643	1.3130E 04	2.1478E 04	2.1478E 04	1.9190E 05	4200
4400	0.4195	2.57189	23.5977	28.1696	9.11070	46.8926	52.0033	1.3744E 04	2.2478E 04	2.2478E 04	2.0118E 05	4400
4600	0.4462	2.57045	23.7128	28.2825	9.10791	47.1197	52.2276	1.4359E 04	2.3478E 04	2.3478E 04	2.1046E 05	4600
4800	0.4713	2.56944	23.8214	28.3900	9.10591	47.3378	52.4459	1.4978E 04	2.4478E 04	2.4478E 04	2.1974E 05	4800
5000	0.4953	2.56804	23.9253	28.4951	9.10471	47.5454	52.6581	1.5598E 04	2.5478E 04	2.5478E 04	2.2902E 05	5000
5200	0.5182	2.56661	24.0270	28.5956	9.10425	47.7456	52.8649	1.6218E 04	2.6478E 04	2.6478E 04	2.3830E 05	5200
5400	0.5403	2.56473	24.1239	28.6927	9.10449	47.9383	53.0658	1.6838E 04	2.7478E 04	2.7478E 04	2.4758E 05	5400
5600	0.5617	2.56217	24.2174	28.7865	9.10536	48.1237	53.2603	1.7458E 04	2.8478E 04	2.8478E 04	2.5686E 05	5600
5800	0.5826	2.56000	24.3075	28.8774	9.10682	48.3031	53.4499	1.8078E 04	2.9478E 04	2.9478E 04	2.6614E 05	5800
6000	0.6031	2.55791	24.3947	28.9656	9.10882	48.4763	53.6331	1.8698E 04	3.0478E 04	3.0478E 04	2.7542E 05	6000
6200	0.6233	2.55516	24.4790	29.0512	9.11131	48.6438	53.8101	1.9318E 04	3.1478E 04	3.1478E 04	2.8470E 05	6200
6400	0.6433	2.55246	24.5607	29.1343	9.11424	48.8061	53.9804	2.0018E 04	3.2478E 04	3.2478E 04	2.9398E 05	6400
6600	0.6631	2.54931	24.6399	29.2152	9.11757	48.9636	54.1441	2.0718E 04	3.3478E 04	3.3478E 04	3.0326E 05	6600
6800	0.6829	2.54577	24.7168	29.2940	9.12126	49.1164	54.3017	2.1418E 04	3.4478E 04	3.4478E 04	3.1254E 05	6800
7000	0.7026	2.54190	24.7915	29.3707	9.12527	49.2649	54.4532	2.2118E 04	3.5478E 04	3.5478E 04	3.2182E 05	7000
7200	0.7223	2.53734	24.8642	29.4456	9.12955	49.4094	54.6000	2.2818E 04	3.6478E 04	3.6478E 04	3.3110E 05	7200
7400	0.7420	2.53242	24.9358	29.5186	9.13408	49.5500	54.7420	2.3518E 04	3.7478E 04	3.7478E 04	3.4038E 05	7400
7600	0.7618	2.52701	25.0039	29.5899	9.13882	49.6869	54.8800	2.4218E 04	3.8478E 04	3.8478E 04	3.4966E 05	7600
7800	0.7817	2.52049	25.0711	29.6596	9.14375	49.8205	55.0142	2.4918E 04	3.9478E 04	3.9478E 04	3.5894E 05	7800
8000	0.8016	2.51304	25.1367	29.7277	9.14883	49.9500	55.1440	2.5618E 04	4.0478E 04	4.0478E 04	3.6822E 05	8000
8200	0.8217	2.50567	25.2007	29.7944	9.15405	50.0766	55.2686	2.6318E 04	4.1478E 04	4.1478E 04	3.7750E 05	8200
8400	0.8419	2.50034	25.2632	29.8596	9.15936	50.2022	55.3886	2.7018E 04	4.2478E 04	4.2478E 04	3.8678E 05	8400
8600	0.8623	2.50004	25.3244	29.9234	9.16477	50.3237	55.5035	2.7718E 04	4.3478E 04	4.3478E 04	3.9606E 05	8600
8800	0.8826	2.49182	25.3842	29.9860	9.17024	50.4435	55.6137	2.8418E 04	4.4478E 04	4.4478E 04	4.0534E 05	8800
9000	0.9034	2.48439	25.4427	30.0472	9.17576	50.5590	55.7195	2.9118E 04	4.5478E 04	4.5478E 04	4.1462E 05	9000
9200	0.9242	2.47730	25.4999	30.1078	9.18131	50.6726	55.8239	2.9818E 04	4.6478E 04	4.6478E 04	4.2390E 05	9200
9400	0.9451	2.47181	25.5568	30.1672	9.18688	50.7841	55.9269	3.0518E 04	4.7478E 04	4.7478E 04	4.3318E 05	9400
9600	0.9651	2.46700	25.6118	30.2259	9.19244	50.8933	56.0280	3.1218E 04	4.8478E 04	4.8478E 04	4.4246E 05	9600
9800	0.9873	2.46350	25.6649	30.2830	9.19803	51.0004	56.1285	3.1918E 04	4.9478E 04	4.9478E 04	4.5174E 05	9800
10000	0.0004	2.46100	25.7179	30.3384	9.20359	51.1055	56.2286	3.2618E 04	5.0478E 04	5.0478E 04	4.6102E 05	10000
10500	0.0424	2.42554	25.8457	28.4713	9.21738	51.3997	56.5771	3.3917E 04	5.4782E 04	5.4782E 04	5.3402E 05	10500
11000	0.1169	2.43235	25.9400	28.6004	9.23092	51.6828	56.8337	3.5216E 04	5.7540E 04	5.7540E 04	5.6743E 05	11000
11500	0.1721	2.43900	26.0252	28.7242	9.24414	51.9596	57.0797	3.6515E 04	6.0298E 04	6.0298E 04	5.9911E 05	11500
12000	0.2277	2.44547	26.1076	28.8431	9.25699	52.2290	57.3160	3.7814E 04	6.3056E 04	6.3056E 04	6.3071E 05	12000
12500	0.2839	2.45174	26.1850	28.9575	9.26944	52.4794	57.5433	3.9113E 04	6.5814E 04	6.5814E 04	6.6222E 05	12500
13000	0.3404	2.45780	26.2589	29.0677	9.28149	52.7063	57.7623	4.0412E 04	6.8572E 04	6.8572E 04	6.9373E 05	13000
13500	0.3973	2.46366	26.3303	29.1740	9.29312	52.9288	57.9735	4.1711E 04	7.1330E 04	7.1330E 04	7.2524E 05	13500
14000	0.4543	2.46931	26.4013	29.2766	9.30436	53.1464	58.1776	4.3010E 04	7.4088E 04	7.4088E 04	7.5675E 05	14000
14500	0.5116	2.47476	26.4701	29.3750	9.31520	53.3599	58.3746	4.4309E 04	7.6846E 04	7.6846E 04	7.8826E 05	14500

TABLE 13 (CONT.). IDEAL GAS FUNCTIONS FOR O++

TEMP. (°F)	PARTIT. FUNCT.	$\frac{H^0 - H^0_{\infty}}{RT}$	$\frac{S^0 - S^0_{\infty}}{RT}$	$\frac{H^0 - H^0_{\infty}}{RT} - \frac{S^0 - S^0_{\infty}}{RT}$	$\frac{H^0 - H^0_{\infty}}{RT} - \frac{S^0 - S^0_{\infty}}{RT} - \frac{S^0 - S^0_{\infty}}{RT}$	$\frac{H^0 - H^0_{\infty}}{RT} - \frac{S^0 - S^0_{\infty}}{RT} - \frac{S^0 - S^0_{\infty}}{RT} - \frac{S^0 - S^0_{\infty}}{RT}$	$\frac{H^0 - H^0_{\infty}}{RT} - \frac{S^0 - S^0_{\infty}}{RT} - \frac{S^0 - S^0_{\infty}}{RT} - \frac{S^0 - S^0_{\infty}}{RT} - \frac{S^0 - S^0_{\infty}}{RT}$	TEMP. (°F)		
15000	9.5689	2.69033	26.7918	29.4718	53.2564	58.3454	5.0077E 04	7.9808E 04	7.9808E 05	15000
15000	9.6264	2.68531	26.7708	29.4549	53.2378	58.3265	5.0077E 04	7.9808E 04	7.9808E 05	15000
16000	9.6639	2.69003	26.7451	29.4351	53.2584	58.3454	5.0077E 04	7.9808E 04	7.9808E 05	16000
16000	9.7214	2.69478	27.0479	29.7427	53.5648	59.1037	5.0077E 04	7.9808E 04	7.9808E 05	16000
17000	9.7989	2.69959	27.1205	29.8278	53.6613	59.2729	5.0077E 04	7.9808E 04	7.9808E 05	17000
17500	9.8563	2.70386	27.2068	29.9106	54.0044	59.3375	5.0077E 04	7.9808E 04	7.9808E 05	17500
18000	9.9110	2.70820	27.2830	29.9912	54.3814	59.4374	5.0077E 04	7.9808E 04	7.9808E 05	18000
18500	9.9710	2.71255	27.3533	30.0697	54.7834	59.5375	5.0077E 04	7.9808E 04	7.9808E 05	18500
19000	10.0282	2.71692	27.4297	30.1462	55.2093	59.6375	5.0077E 04	7.9808E 04	7.9808E 05	19000
19500	10.0852	2.72057	27.5003	30.2208	55.6476	59.7375	5.0077E 04	7.9808E 04	7.9808E 05	19500
20000	10.1423	2.72451	27.5692	30.2937	56.1006	59.8375	5.0077E 04	7.9808E 04	7.9808E 05	20000
20500	10.1994	2.72846	27.6366	30.3642	56.5686	59.9375	5.0077E 04	7.9808E 04	7.9808E 05	20500
21000	10.2565	2.73240	27.7030	30.4326	57.0586	60.0375	5.0077E 04	7.9808E 04	7.9808E 05	21000
21500	10.3136	2.73635	27.7681	30.5000	57.5686	60.1375	5.0077E 04	7.9808E 04	7.9808E 05	21500
22000	10.3707	2.74030	27.8326	30.5664	58.0886	60.2375	5.0077E 04	7.9808E 04	7.9808E 05	22000
22500	10.4278	2.74425	27.8961	30.6328	58.6186	60.3375	5.0077E 04	7.9808E 04	7.9808E 05	22500
23000	10.4849	2.74820	27.9586	30.6982	59.1586	60.4375	5.0077E 04	7.9808E 04	7.9808E 05	23000
23500	10.5420	2.75215	28.0201	30.7637	59.7086	60.5375	5.0077E 04	7.9808E 04	7.9808E 05	23500
24000	10.5991	2.75610	28.0816	30.8291	60.2686	60.6375	5.0077E 04	7.9808E 04	7.9808E 05	24000
24500	10.6562	2.76005	28.1421	30.8946	60.8186	60.7375	5.0077E 04	7.9808E 04	7.9808E 05	24500
25000	10.7133	2.76400	28.2026	30.9591	61.3686	60.8375	5.0077E 04	7.9808E 04	7.9808E 05	25000
25500	10.7704	2.76795	28.2631	31.0246	61.9186	60.9375	5.0077E 04	7.9808E 04	7.9808E 05	25500
26000	10.8275	2.77190	28.3236	31.0901	62.4686	61.0375	5.0077E 04	7.9808E 04	7.9808E 05	26000
26500	10.8846	2.77585	28.3841	31.1556	63.0186	61.1375	5.0077E 04	7.9808E 04	7.9808E 05	26500
27000	10.9417	2.77980	28.4446	31.2211	63.5686	61.2375	5.0077E 04	7.9808E 04	7.9808E 05	27000
27500	11.0000	2.78375	28.5051	31.2866	64.1186	61.3375	5.0077E 04	7.9808E 04	7.9808E 05	27500
28000	11.0583	2.78770	28.5656	31.352						

TABLE 14. IDEAL GAS FUNCTIONS FOR AR++ (ATOMIC WEIGHT 39.9470, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 9B FOR LIST OF STATES USED.

TEMP. (°K)	PARTIC. FUNCT.	$\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT} - \frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	TEMP. (°K)
3000	7.2309	2.66431	23.0019	24.6662	9.99410	97.5107	96.7509	1.00410	0	1.00000	0	3000
3200	7.3224	2.67975	24.0346	26.7153	9.32511	97.4707	95.0856	1.04810	0	1.00000	0	3200
3400	7.4017	2.69690	24.1969	26.8729	8.61733	97.4307	92.6509	1.13246	0	1.00000	0	3400
3600	7.4759	2.71504	24.3498	27.0228	7.88770	97.3907	88.1909	1.24122	0	1.00000	0	3600
3800	7.5457	2.73383	24.4962	27.1651	7.16537	97.3507	82.7115	1.38176	0	1.00000	0	3800
4000	7.6118	2.75331	24.6312	27.3005	6.45063	97.3107	76.2206	1.55522	0	1.00000	0	4000
4200	7.6748	2.77345	24.7614	27.4298	5.74262	97.2707	68.7276	1.76396	0	1.00000	0	4200
4400	7.7351	2.79412	24.8855	27.5537	5.04000	97.2307	60.2326	2.00810	0	1.00000	0	4400
4600	7.7931	2.81531	25.0041	27.6725	4.34262	97.1907	50.7356	2.28810	0	1.00000	0	4600
4800	7.8492	2.83704	25.1177	27.7867	3.65062	97.1507	40.2386	2.60310	0	1.00000	0	4800
5000	7.9037	2.85931	25.2267	27.8966	2.96462	97.1107	29.7416	2.95310	0	1.00000	0	5000
5200	7.9567	2.88212	25.3314	28.0021	2.28462	97.0707	19.2446	3.33810	0	1.00000	0	5200
5400	8.0086	2.90543	25.4323	28.1051	1.60962	97.0307	8.7476	3.74810	0	1.00000	0	5400
5600	8.0593	2.92924	25.5293	28.2061	0.93962	96.9907	-2.7506	4.18310	0	1.00000	0	5600
5800	8.1091	2.95355	25.6234	28.3000	0.27462	96.9507	-12.2536	4.64310	0	1.00000	0	5800
6000	8.1581	2.97836	25.7142	28.3928	-0.38538	96.9107	-21.7566	5.12810	0	1.00000	0	6000
6200	8.2063	2.99966	25.8020	28.4829	-1.08538	96.8707	-31.2596	5.63810	0	1.00000	0	6200
6400	8.2539	3.02145	25.8872	28.5703	-1.78538	96.8307	-40.7626	6.17310	0	1.00000	0	6400
6600	8.3008	3.04374	25.9698	28.6552	-2.48538	96.7907	-50.2656	6.73310	0	1.00000	0	6600
6800	8.3472	3.06653	26.0500	28.7377	-3.18538	96.7507	-59.7686	7.31810	0	1.00000	0	6800
7000	8.3930	3.08982	26.1279	28.8180	-3.88538	96.7107	-69.2716	7.92810	0	1.00000	0	7000
7200	8.4383	3.11361	26.2037	28.8961	-4.58538	96.6707	-78.7746	8.56310	0	1.00000	0	7200
7400	8.4832	3.13780	26.2775	28.9722	-5.28538	96.6307	-88.2776	9.22310	0	1.00000	0	7400
7600	8.5276	3.16249	26.3494	29.0463	-5.98538	96.5907	-97.7806	9.90810	0	1.00000	0	7600
7800	8.5715	3.18768	26.4195	29.1186	-6.68538	96.5507	-107.2836	10.62310	0	1.00000	0	7800
8000	8.6151	3.21337	26.4879	29.1891	-7.38538	96.5107	-116.7866	11.36810	0	1.00000	0	8000
8200	8.6582	3.23956	26.5546	29.2579	-8.08538	96.4707	-126.2896	12.14310	0	1.00000	0	8200
8400	8.7009	3.26625	26.6198	29.3250	-8.78538	96.4307	-135.7926	12.94810	0	1.00000	0	8400
8600	8.7433	3.29344	26.6835	29.3906	-9.48538	96.3907	-145.2956	13.78310	0	1.00000	0	8600
8800	8.7852	3.32113	26.7457	29.4547	-10.18538	96.3507	-154.7986	14.64810	0	1.00000	0	8800
9000	8.8267	3.34932	26.8065	29.5174	-10.88538	96.3107	-164.3016	15.54310	0	1.00000	0	9000
9200	8.8679	3.37791	26.8662	29.5787	-11.58538	96.2707	-173.8046	16.46810	0	1.00000	0	9200
9400	8.9086	3.40690	26.9244	29.6384	-12.28538	96.2307	-183.3076	17.42310	0	1.00000	0	9400
9600	8.9490	3.43629	26.9817	29.6973	-12.98538	96.1907	-192.8106	18.40810	0	1.00000	0	9600
9800	8.9890	3.46618	27.0377	29.7556	-13.68538	96.1507	-202.3136	19.42310	0	1.00000	0	9800
10000	9.0286	3.49657	27.0926	29.8110	-14.38538	96.1107	-211.8166	20.46810	0	1.00000	0	10000
10500	9.1261	3.58196	27.2253	29.9448	-15.78538	96.0307	-226.3196	22.01310	0	1.00000	0	10500
11000	9.2212	3.66735	27.3520	30.0761	-17.18538	95.9507	-240.8226	23.55810	0	1.00000	0	11000
11500	9.3140	3.75274	27.4731	30.1995	-18.58538	95.8707	-255.3256	25.10310	0	1.00000	0	11500
12000	9.4045	3.83813	27.5892	30.3174	-19.98538	95.7907	-269.8286	26.64810	0	1.00000	0	12000
12500	9.4928	3.92352	27.7006	30.4304	-21.38538	95.7107	-284.3316	28.19310	0	1.00000	0	12500
13000	9.5789	4.00891	27.8077	30.5384	-22.78538	95.6307	-298.8346	29.73810	0	1.00000	0	13000
13500	9.6628	4.09430	27.9108	30.6423	-24.18538	95.5507	-313.3376	31.28310	0	1.00000	0	13500
14000	9.7447	4.17969	28.0101	30.7423	-25.58538	95.4707	-327.8406	32.82810	0	1.00000	0	14000
14500	9.8244	4.26508	28.1060	30.8385	-26.98538	95.3907	-342.3436	34.37310	0	1.00000	0	14500

TABLE 14 (CONT.). IDEAL GAS FUNCTIONS FOR $\text{Ar} \leftrightarrow$

[illegible]

TABLE 15. IDEAL GAS FUNCTIONS FOR C 3+ (ATOMIC WEIGHT 12.0095, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 59 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{W^2-E^2}{RT}$	$-\frac{F^2-E^2}{RT}$	S^2	$\ln^2 \frac{W^2-E^2}{RT}$	$-\ln^2 \frac{F^2-E^2}{RT}$	$\frac{S^2}{CAL/MOLE}$	$\frac{F^2-E^2}{CAL/MOLE}$	$\frac{W^2-E^2}{CAL/MOLE}$	$-(F^2-E^2)$	TEMP. (°K)
3000	2.0000	2.50000	20.7727	23.2727	4.96791	41.2797	46.2446	8.9422E 03	1.4904E 04	1.2304E 05	3000
3200	2.0000	2.49999	20.9340	23.4340	4.96791	41.5793	46.5472	9.5304E 03	1.5097E 04	1.3312E 05	3200
3400	2.0000	2.50000	21.0856	23.5856	4.96791	41.9005	46.8644	1.0135E 04	1.6091E 04	1.4244E 05	3400
3600	2.0000	2.50000	21.2285	23.7285	4.96791	42.1805	47.1524	1.0731E 04	1.7004E 04	1.5186E 05	3600
3800	2.0000	2.50000	21.3636	23.8636	4.96791	42.4531	47.4210	1.1327E 04	1.8070E 04	1.6132E 05	3800
4000	2.0000	2.50000	21.4919	23.9919	4.96791	42.7079	47.6750	1.1923E 04	1.9072E 04	1.7083E 05	4000
4200	2.0000	2.50000	21.6136	24.1136	4.96791	42.9503	47.9182	1.2519E 04	2.0095E 04	1.8039E 05	4200
4400	2.0000	2.50000	21.7301	24.2301	4.96791	43.1814	48.1493	1.3115E 04	2.1059E 04	1.9000E 05	4400
4600	2.0000	2.50000	21.8413	24.3413	4.96791	43.4022	48.3701	1.3711E 04	2.2052E 04	2.0000E 05	4600
4800	2.0000	2.50000	21.9477	24.4477	4.96791	43.6136	48.5816	1.4308E 04	2.3044E 04	2.0939E 05	4800
5000	2.0000	2.50000	22.0497	24.5497	4.96791	43.8144	48.7844	1.4904E 04	2.4040E 04	2.1908E 05	5000
5200	2.0000	2.50000	22.1478	24.6478	4.96792	44.0113	48.9792	1.5500E 04	2.5033E 04	2.2886E 05	5200
5400	2.0000	2.50000	22.2421	24.7421	4.96792	44.2048	49.1687	1.6096E 04	2.6023E 04	2.3872E 05	5400
5600	2.0000	2.50000	22.3330	24.8330	4.96792	44.3957	49.3474	1.6692E 04	2.7010E 04	2.4857E 05	5600
5800	2.0000	2.50001	22.4208	24.9208	4.96792	44.5838	49.5217	1.7288E 04	2.8014E 04	2.5841E 05	5800
6000	2.0000	2.50001	22.5055	25.0055	4.96793	44.7722	49.6901	1.7885E 04	2.9000E 04	2.6833E 05	6000
6200	2.0000	2.50002	22.5875	25.0875	4.96794	44.9621	49.8530	1.8481E 04	3.0000E 04	2.7827E 05	6200
6400	2.0000	2.50003	22.6669	25.1669	4.96794	45.1537	49.9974	1.9077E 04	3.1000E 04	2.8827E 05	6400
6600	2.0000	2.50003	22.7438	25.2438	4.96798	45.3440	50.1337	1.9673E 04	3.2000E 04	3.0034E 05	6600
6800	2.0000	2.50005	22.8184	25.3185	4.96801	45.5340	50.2690	2.0270E 04	3.3000E 04	3.1042E 05	6800
7000	2.0000	2.50007	22.8909	25.3910	4.96805	45.7230	50.4041	2.0866E 04	3.4000E 04	3.2044E 05	7000
7200	2.0000	2.50010	22.9613	25.4614	4.96811	45.9120	50.5391	2.1463E 04	3.5000E 04	3.3052E 05	7200
7400	2.0000	2.50013	23.0298	25.5300	4.96818	46.1010	50.6723	2.2059E 04	3.6000E 04	3.4060E 05	7400
7600	2.0000	2.50018	23.0965	25.5967	4.96827	46.2906	50.8049	2.2656E 04	3.7000E 04	3.5068E 05	7600
7800	2.0000	2.50024	23.1615	25.6617	4.96839	46.4806	50.9340	2.3254E 04	3.8000E 04	3.6076E 05	7800
8000	2.0001	2.50032	23.2248	25.7251	4.96854	46.6714	51.0600	2.3851E 04	3.9000E 04	3.7084E 05	8000
8200	2.0001	2.50041	23.2865	25.7869	4.96873	46.8761	51.2428	2.4449E 04	4.0000E 04	3.8092E 05	8200
8400	2.0001	2.50052	23.3468	25.8473	4.96895	47.0839	51.3628	2.5047E 04	4.1000E 04	3.9100E 05	8400
8600	2.0001	2.50064	23.4056	25.9063	4.96923	47.2941	51.4800	2.5644E 04	4.2000E 04	4.0108E 05	8600
8800	2.0002	2.50083	23.4631	25.9639	4.96955	47.5066	51.5946	2.6242E 04	4.3000E 04	4.1116E 05	8800
9000	2.0002	2.50102	23.5193	26.0203	4.96994	47.7217	51.7067	2.6840E 04	4.4000E 04	4.2124E 05	9000
9200	2.0002	2.50125	23.5743	26.0755	4.97040	47.9390	51.8163	2.7438E 04	4.5000E 04	4.3132E 05	9200
9400	2.0003	2.50152	23.6281	26.1296	4.97092	48.1529	51.9236	2.8037E 04	4.6000E 04	4.4140E 05	9400
9600	2.0004	2.50182	23.6807	26.1825	4.97151	48.3695	52.0290	2.8636E 04	4.7000E 04	4.5148E 05	9600
9800	2.0005	2.50218	23.7323	26.2345	4.97224	48.5883	52.1323	2.9235E 04	4.8000E 04	4.6156E 05	9800
10000	2.0006	2.50258	23.7829	26.2854	4.97303	48.8096	52.2335	2.9834E 04	4.9000E 04	4.7164E 05	10000
10500	2.0009	2.50382	23.9050	26.4088	4.97550	49.2587	52.4787	3.1378E 04	5.2243E 04	5.2243E 05	10500
11000	2.0013	2.50545	24.0215	26.5270	4.97874	49.7347	52.7135	3.2907E 04	5.5465E 04	5.5465E 05	11000
11500	2.0018	2.50752	24.1329	26.6404	4.98264	49.9541	52.9390	3.4436E 04	5.8696E 04	5.8696E 05	11500
12000	2.0026	2.51099	24.2397	26.7498	4.98796	49.9541	53.1562	3.5965E 04	6.1927E 04	6.1927E 05	12000
12500	2.0036	2.51519	24.3422	26.8554	4.99413	49.3720	53.3642	3.7507E 04	6.5158E 04	6.5158E 05	12500
13000	2.0047	2.52047	24.4409	26.9577	5.00144	48.5660	53.5695	3.9049E 04	6.8389E 04	6.8389E 05	13000
13500	2.0062	2.52615	24.5359	27.0571	5.00995	48.7570	53.7699	4.0590E 04	7.1620E 04	7.1620E 05	13500
14000	2.0079	2.53266	24.6277	27.1538	5.01960	48.9363	53.9649	4.2131E 04	7.4851E 04	7.4851E 05	14000
14500	2.0099	2.53999	24.7166	27.2480	5.03069	49.1137	54.1644	4.3672E 04	7.8082E 04	7.8082E 05	14500

TABLE 15 (CONT.). IDEAL GAS FUNCTIONS FOR C₃H₈

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{8\pi^2 I}$	$-\frac{F^0 - F}{RT}$	$\ln \frac{h^2}{8\pi^2 I}$	$-\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	$\ln \frac{h^2}{8\pi^2 I}$	TEMP. (°K)			
19000	2.0123	2.53776	26.8024	27.3401	5.04296	49.2644	54.3294	4.58376	04	7.54446	04	7.39306	05	15000
15500	2.0150	2.54457	26.8057	27.4303	5.05467	49.2644	54.3294	4.58376	04	7.54446	04	7.39306	05	15500
14000	2.0181	2.55199	26.8066	27.5186	5.06712	49.2644	54.3294	4.58376	04	7.54446	04	7.39306	05	16000
12500	2.0215	2.56000	26.8052	27.6052	5.08052	49.2644	54.3294	4.58376	04	7.54446	04	7.39306	05	16500
11000	2.0254	2.56859	25.1218	27.6904	5.10422	49.2644	54.3294	4.58376	04	7.54446	04	7.39306	05	17000
17000	2.0297	2.57773	25.1264	27.7761	5.12231	50.0694	55.1317	5.48646	04	8.04416	04	8.76216	05	17500
16000	2.0344	2.58737	25.2691	27.8565	5.14153	50.2139	55.3555	5.67706	04	8.2176	04	9.03896	05	18000
15000	2.0396	2.59748	25.3602	27.9376	5.16162	50.3551	55.5167	5.87276	04	8.44906	04	9.31576	05	18500
14000	2.0452	2.60803	25.4096	28.0176	5.18258	50.4933	55.6754	6.07136	04	8.64696	04	9.59376	05	19000
13500	2.0512	2.61896	25.4775	28.0964	5.20431	50.6279	55.8322	6.27346	04	1.01436	05	9.87246	05	19500
20000	2.0577	2.63026	25.5639	28.1761	5.22673	50.7600	55.9867	6.47916	04	1.04536	05	1.01526	06	20000
22000	2.0680	2.64799	25.7068	28.2568	5.25140	51.2625	56.5861	7.33586	04	1.12786	05	1.12786	06	22000
24000	2.1251	2.72791	26.0320	28.7599	5.42082	51.7298	57.1506	8.74086	04	1.30106	05	1.26156	06	24000
26000	2.1625	2.77770	26.2523	29.0300	5.51976	52.1676	57.6074	9.18476	04	1.43516	05	1.35646	06	26000
28000	2.2175	2.82956	26.4559	29.2854	5.61495	52.5902	58.1950	1.01586	05	1.57226	05	1.47226	06	28000
30000	2.2714	2.87623	26.6564	29.5266	5.70363	52.9706	58.6743	1.11496	05	1.71116	05	1.58916	06	30000
32000	2.3246	2.91801	26.8629	29.7540	5.78965	53.3414	59.1260	1.21526	05	1.85116	05	1.70946	06	32000
34000	2.3909	2.96756	27.0205	29.9651	5.87529	53.6963	59.5516	1.31586	05	1.99156	05	1.82586	06	34000
36000	2.4591	2.97989	27.1900	30.1698	5.92153	54.0309	59.9525	1.41646	05	2.13186	05	1.94516	06	36000
38000	2.5216	3.00622	27.3518	30.3601	5.97784	54.3526	60.3305	1.51696	05	2.27106	05	2.06546	06	38000
40000	2.5899	3.03293	27.5048	30.5397	6.02693	54.6605	60.6875	1.61596	05	2.41086	05	2.18646	06	40000
42000	2.6595	3.05947	27.6553	30.7098	6.06973	54.9557	61.0254	1.71476	05	2.54936	05	2.30816	06	42000
44000	2.7302	3.07334	27.7978	30.8712	6.10723	55.2389	61.3461	1.81286	05	2.68726	05	2.43056	06	44000
46000	2.8016	3.07905	27.9348	31.0249	6.14044	55.5111	61.6516	1.91056	05	2.82446	05	2.55356	06	46000
48000	2.8739	3.10511	28.0667	31.1718	6.17036	55.7731	61.9435	2.00796	05	2.96186	05	2.67716	06	48000
50000	2.9466	3.11896	28.1937	31.3127	6.19793	56.0256	62.2235	2.10546	05	3.09906	05	2.80136	06	50000
60000	3.3176	3.18422	28.7681	31.9523	6.37758	57.1649	63.4945	2.40426	05	3.79656	05	3.45006	06	60000
70000	3.7081	3.25371	29.2667	32.5364	6.48951	58.1538	64.6434	3.15186	05	4.54276	05	4.07086	06	70000
80000	4.1353	3.37446	29.7076	33.0821	6.70561	59.0339	65.7395	3.77486	05	5.36456	05	4.72276	06	80000
90000	4.6177	3.50377	30.1124	33.6162	6.96257	59.8383	66.8009	4.47796	05	6.26636	05	5.58546	06	90000
100000	5.1609	3.63936	30.4886	34.1279	7.23200	60.5858	67.8178	5.26486	05	7.23206	05	6.05866	06	100000
150000	9.9685	4.07517	32.0644	36.1595	8.07803	61.7172	71.8152	7.16436	05	1.21576	06	1.31526	07	150000
200000	14.3791	4.08585	33.2445	37.3304	8.11926	66.0624	76.1817	1.27646	06	1.62396	06	1.62396	07	200000
300000	23.9979	3.80353	36.8505	38.6540	7.55823	76.8118	76.8118	1.07136	06	2.26736	06	2.07746	07	300000
400000	36.4641	3.55342	38.9085	39.6619	7.06123	71.3562	76.8118	2.02906	06	2.82456	06	2.65426	07	400000
500000	45.2214	3.37422	36.6811	40.6553	6.70513	72.8914	79.5965	2.35906	06	3.35206	06	3.64446	07	500000
600000	52.3945	3.26434	37.2842	40.5285	6.44704	76.0898	80.5369	2.87596	06	3.86826	06	4.44546	07	600000
800000	63.2599	3.07175	38.1918	41.2635	6.10408	75.4933	81.9974	3.29356	06	4.88336	06	6.07156	07	800000
1000000	70.9766	2.96334	38.8647	41.8281	5.88864	77.2306	83.1193	3.90156	06	5.88864	06	7.72316	07	1000000

TABLE 16. IDEAL GAS FUNCTIONS FOR N₂ (ATOMIC WEIGHT 14.0056, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 60 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{U^0 - U}{RT}$	$\frac{H^0 - U}{RT}$	$\frac{S^0 - S}{R}$	$\ln \frac{U^0 - U}{RT} - \frac{H^0 - U}{RT} - \frac{S^0 - S}{R}$	$\frac{U^0 - U}{RT} - \frac{H^0 - U}{RT} - \frac{S^0 - S}{R}$	$\frac{U^0 - U}{RT} - \frac{H^0 - U}{RT} - \frac{S^0 - S}{R}$	$\frac{U^0 - U}{RT} - \frac{H^0 - U}{RT} - \frac{S^0 - S}{R}$	$\frac{U^0 - U}{RT} - \frac{H^0 - U}{RT} - \frac{S^0 - S}{R}$	TEMP. (°K)
3000	1.0000	2.50000	20.3101	22.8101	4.96791	40.3995	45.3274	2.9422E 03	1.4904E 04	3000
3200	1.0000	2.50000	20.4714	22.9714	4.96791	40.6001	45.6001	9.5384E 03	1.5097E 04	3200
3400	1.0000	2.50000	20.6230	23.1230	4.96791	40.8113	45.8113	1.0133E 04	1.6097E 04	3400
3600	1.0000	2.50000	20.7659	23.2659	4.96791	41.0253	46.0253	1.0731E 04	1.7094E 04	3600
3800	1.0000	2.50000	20.9011	23.4011	4.96791	41.2339	46.2339	1.1327E 04	1.8088E 04	3800
4000	1.0000	2.50000	21.0293	23.5293	4.96791	41.4387	46.4387	1.1923E 04	1.9078E 04	4000
4200	1.0000	2.50000	21.1513	23.6513	4.96791	41.6391	46.6391	1.2519E 04	2.0064E 04	4200
4400	1.0000	2.50000	21.2676	23.7676	4.96791	41.8352	46.8352	1.3115E 04	2.1046E 04	4400
4600	1.0000	2.50000	21.3787	23.8787	4.96791	42.0274	47.0274	1.3711E 04	2.2025E 04	4600
4800	1.0000	2.50000	21.4851	23.9851	4.96791	42.2154	47.2154	1.4308E 04	2.3002E 04	4800
5000	1.0000	2.50000	21.5871	24.0871	4.96791	42.3992	47.3992	1.4904E 04	2.3978E 04	5000
5200	1.0000	2.50000	21.6852	24.1852	4.96791	42.5787	47.5787	1.5500E 04	2.4953E 04	5200
5400	1.0000	2.50000	21.7794	24.2794	4.96791	42.7539	47.7539	1.6096E 04	2.5927E 04	5400
5600	1.0000	2.50000	21.8705	24.3705	4.96791	42.9248	47.9248	1.6692E 04	2.6900E 04	5600
5800	1.0000	2.50001	21.9582	24.4582	4.96793	43.0914	48.0914	1.7288E 04	2.7872E 04	5800
6000	1.0000	2.50001	22.0430	24.5430	4.96794	43.2539	48.2539	1.7884E 04	2.8844E 04	6000
6200	1.0000	2.50002	22.1249	24.6250	4.96796	43.4124	48.4124	1.8480E 04	2.9815E 04	6200
6400	1.0000	2.50004	22.2043	24.7043	4.96799	43.5669	48.5669	1.9076E 04	3.0786E 04	6400
6600	1.0000	2.50006	22.2812	24.7813	4.96803	43.7174	48.7174	1.9672E 04	3.1757E 04	6600
6800	1.0000	2.50008	22.3559	24.8560	4.96808	43.8644	48.8644	2.0268E 04	3.2728E 04	6800
7000	1.0000	2.50012	22.4283	24.9285	4.96816	44.0074	49.0074	2.0864E 04	3.3699E 04	7000
7200	1.0000	2.50018	22.4988	25.0000	4.96826	44.1464	49.1464	2.1460E 04	3.4670E 04	7200
7400	1.0000	2.50025	22.5673	25.0675	4.96840	44.2814	49.2814	2.2056E 04	3.5641E 04	7400
7600	1.0000	2.50034	22.6340	25.1343	4.96858	44.4124	49.4124	2.2652E 04	3.6612E 04	7600
7800	1.0000	2.50046	22.6989	25.1994	4.96882	44.5394	49.5394	2.3248E 04	3.7583E 04	7800
8000	1.0001	2.50061	22.7622	25.2628	4.96912	44.6624	49.6624	2.3844E 04	3.8554E 04	8000
8200	1.0001	2.50079	22.8240	25.3245	4.96949	44.7814	49.7814	2.4440E 04	3.9525E 04	8200
8400	1.0001	2.50103	22.8842	25.3847	4.96995	44.8964	49.8964	2.5036E 04	4.0496E 04	8400
8600	1.0001	2.50131	22.9431	25.4444	4.97052	45.0074	50.0074	2.5632E 04	4.1467E 04	8600
8800	1.0002	2.50165	23.0004	25.5022	4.97120	45.1144	50.1144	2.6228E 04	4.2438E 04	8800
9000	1.0002	2.50207	23.0568	25.5589	4.97202	45.2174	50.2174	2.6824E 04	4.3409E 04	9000
9200	1.0002	2.50256	23.1118	25.6144	4.97299	45.3164	50.3164	2.7420E 04	4.4380E 04	9200
9400	1.0003	2.50313	23.1656	25.6688	4.97412	45.4114	50.4114	2.8016E 04	4.5351E 04	9400
9600	1.0004	2.50379	23.2183	25.7221	4.97545	45.5024	50.5024	2.8612E 04	4.6322E 04	9600
9800	1.0005	2.50456	23.2700	25.7745	4.97698	45.5894	50.5894	2.9208E 04	4.7293E 04	9800
10000	1.0006	2.50545	23.3206	25.8260	4.97874	45.6714	50.6714	2.9804E 04	4.8264E 04	10000
10500	1.0009	2.50822	23.4429	25.9511	4.98626	46.3049	51.3049	3.1400E 04	5.0260E 04	10500
11000	1.0014	2.51193	23.5596	26.0716	4.99162	46.8169	51.8169	3.3006E 04	5.2256E 04	11000
11500	1.0020	2.51672	23.6714	26.1881	5.00114	47.3090	52.3090	3.4612E 04	5.4252E 04	11500
12000	1.0028	2.52274	23.7786	26.3014	5.01310	47.7821	52.7821	3.6218E 04	5.6248E 04	12000
12500	1.0039	2.53012	23.8818	26.4119	5.02774	47.2430	52.2430	3.7824E 04	5.8244E 04	12500
13000	1.0053	2.53896	23.9812	26.5201	5.04532	47.0454	52.0454	3.9430E 04	6.0240E 04	13000
13500	1.0069	2.54935	24.0772	26.6265	5.06598	46.8453	51.8453	4.1036E 04	6.2236E 04	13500
14000	1.0090	2.56137	24.1701	26.7315	5.08986	46.6430	51.6430	4.2642E 04	6.4232E 04	14000
14500	1.0114	2.57504	24.2602	26.8353	5.11704	46.4391	51.4391	4.4248E 04	6.6228E 04	14500

TABLE 16 (CONT.). IDEAL GAS FUNCTIONS FOR N₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{2\pi kT}$	$\ln \frac{h^2}{2\pi kT}$	$\ln \frac{h^2}{2\pi kT} - \ln \frac{h^2}{2\pi kT}$	$\ln \frac{h^2}{2\pi kT} - \ln \frac{h^2}{2\pi kT}$	$\ln \frac{h^2}{2\pi kT} - \ln \frac{h^2}{2\pi kT}$	$\ln \frac{h^2}{2\pi kT} - \ln \frac{h^2}{2\pi kT}$	$\ln \frac{h^2}{2\pi kT} - \ln \frac{h^2}{2\pi kT}$	TEMP. (°K)
15000	1.0152	2.59039	24.3478	26.9282	5.14754	48.3831	53.9304	4.74045	15000
15000	1.0175	2.60761	24.5350	27.0404	5.18134	48.5524	53.7337	4.72135	15000
15000	1.0213	2.62606	24.5161	27.1421	5.21042	48.7175	53.5959	4.69106	15000
15000	1.0255	2.64489	24.5972	27.2435	5.24642	48.8787	54.1373	4.67875	15000
15000	1.0304	2.66803	24.6765	27.3445	5.30111	49.0363	54.3361	4.67875	15000
17500	1.0357	2.69118	24.7542	27.4453	5.34107	49.1906	54.5304	4.67875	17500
18000	1.0417	2.71564	24.8303	27.5406	5.39081	49.3419	54.7304	4.67875	18000
18500	1.0482	2.74130	24.9041	27.6444	5.4474	49.4905	54.9379	4.67875	18500
19000	1.0554	2.76803	24.9785	27.7466	5.50553	49.6365	55.1370	4.67875	19000
19500	1.0631	2.79569	25.0508	27.8465	5.55541	49.7801	55.3356	4.67875	19500
20000	1.0715	2.82416	25.1219	27.9441	5.6126	49.9214	55.5335	4.67875	20000
20000	1.1112	2.94332	25.3946	28.110	5.8481	50.4473	56.3162	4.67875	20000
24000	1.1610	3.06483	25.6580	28.28	6.0903	50.9564	57.0769	4.67875	24000
24000	1.2204	3.18193	25.9079	28.49	6.3230	51.4324	57.8044	4.67875	24000
28000	1.2888	3.29000	26.1478	28.6378	6.53776	51.8999	58.4977	4.67875	28000
30000	1.3656	3.38648	26.3781	28.7646	6.72950	52.4177	59.1672	4.67875	30000
32000	1.4500	3.47046	26.5946	28.8899	6.89637	52.8575	59.7538	4.67875	32000
34000	1.5412	3.54214	26.8120	29.0163	7.03882	53.2799	60.3108	4.67875	34000
36000	1.6387	3.60240	27.0163	29.187	7.15857	53.6858	60.8443	4.67875	36000
38000	1.7417	3.65245	27.2124	29.3649	7.25803	54.0756	61.3336	4.67875	38000
40000	1.8496	3.69359	27.4008	29.5408	7.33977	54.4500	61.7890	4.67875	40000
42000	1.9624	3.72797	27.5819	29.7166	7.40330	54.8098	62.2161	4.67875	42000
44000	2.0790	3.75406	27.7559	29.8931	7.45994	55.1556	62.6155	4.67875	44000
46000	2.1993	3.77560	27.9233	30.0689	7.50273	55.4882	62.9909	4.67875	46000
48000	2.3228	3.79257	28.0843	30.2449	7.53646	55.8082	63.3447	4.67875	48000
50000	2.4494	3.80575	28.2394	30.4209	7.56266	56.1164	63.6791	4.67875	50000
60000	3.1180	3.83499	28.9364	32.7716	7.62075	57.5018	65.1226	4.67875	60000
70000	3.8318	3.83825	29.5281	33.3644	7.62724	58.4773	66.3045	4.67875	70000
80000	4.5828	3.84421	30.0409	33.8854	7.64007	59.4963	67.3364	4.67875	80000
90000	5.3758	3.84932	30.4950	34.3643	7.64898	60.5966	68.2875	4.67875	90000
100000	6.2242	3.81726	30.9049	34.8222	7.64625	61.6132	69.1975	4.67875	100000
120000	11.9275	4.33239	32.5690	36.9014	8.60917	64.7700	73.3291	4.67875	120000
140000	20.9740	4.84600	33.9526	38.3968	9.03365	67.2708	78.3044	4.67875	140000
160000	47.0546	4.30002	35.7644	40.0344	8.66408	70.8909	81.3484	4.67875	160000
180000	76.9378	3.05161	36.8955	40.9369	8.05082	73.2975	81.3484	4.67875	180000
200000	105.8050	3.80402	37.7617	41.5657	7.55922	75.0387	82.5979	4.67875	200000
400000	131.9011	3.61730	38.4379	42.0552	7.18818	76.3325	83.5707	4.67875	400000
600000	175.1500	3.36322	39.4408	42.8040	6.68326	78.3753	85.0586	4.67875	600000
1000000	208.4488	3.20130	40.1726	43.3739	6.36152	79.8297	86.1912	4.67875	1000000

TABLE 1/. IDEAL GAS FUNCTIONS FOR \bar{U}^0 (ATOMIC WEIGHT 15.9977, $R = 1.98717$ CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 61 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{W^0 - E^0}{RT}$	$-\frac{E^0 - E^0}{RT}$	$\ln \frac{W^0 - E^0}{RT} - \ln \frac{W^0 - E^0}{RT}$	$-\ln \frac{W^0 - E^0}{RT} - \ln \frac{W^0 - E^0}{RT}$	$-\ln \frac{W^0 - E^0}{RT} - \ln \frac{W^0 - E^0}{RT}$	TEMP. (°K)
3000	5.3232	2.61572	22.1817	26.7974	5.19787	44.0707	3000
3200	5.3619	2.60896	22.3503	26.9593	5.18443	44.4137	3200
3400	5.3965	2.60294	22.5003	27.1112	5.17247	44.7277	3400
3600	5.4275	2.59755	22.6549	27.2545	5.16176	45.0230	3600
3800	5.4555	2.59269	22.7972	27.3899	5.15211	45.3018	3800
4000	5.4808	2.58829	22.9301	27.5184	5.14337	45.5659	4000
4200	5.5040	2.58429	23.0543	27.6406	5.13441	45.8166	4200
4400	5.5251	2.58064	23.1764	27.7570	5.12515	46.0554	4400
4600	5.5445	2.57728	23.2911	27.8683	5.11649	46.2832	4600
4800	5.5624	2.57420	23.4007	27.9749	5.11136	46.5010	4800
5000	5.5790	2.57135	23.5057	28.0770	5.10699	46.7097	5000
5200	5.5943	2.56871	23.6065	28.1752	5.10344	46.9100	5200
5400	5.6086	2.56626	23.7033	28.2697	5.09958	47.1026	5400
5600	5.6219	2.56398	23.7967	28.3607	5.09504	47.2879	5600
5800	5.6343	2.56185	23.8866	28.4485	5.09081	47.4667	5800
6000	5.6459	2.55985	23.9734	28.5333	5.08685	47.6392	6000
6200	5.6569	2.55798	24.0573	28.6151	5.08314	47.8059	6200
6400	5.6671	2.55623	24.1385	28.6948	5.07965	47.9672	6400
6600	5.6768	2.55458	24.2172	28.7717	5.07637	48.1235	6600
6800	5.6859	2.55302	24.2934	28.8464	5.07328	48.2750	6800
7000	5.6945	2.55155	24.3674	28.9196	5.07036	48.4220	7000
7200	5.7027	2.55017	24.4392	28.9904	5.06760	48.5640	7200
7400	5.7104	2.54886	24.5091	29.0586	5.06500	48.7034	7400
7600	5.7178	2.54761	24.5771	29.1247	5.06253	48.8387	7600
7800	5.7248	2.54644	24.6432	29.1897	5.06020	48.9701	7800
8000	5.7314	2.54533	24.7077	29.2530	5.05798	49.0982	8000
8200	5.7378	2.54427	24.7705	29.3148	5.05589	49.2231	8200
8400	5.7438	2.54327	24.8318	29.3751	5.05391	49.3459	8400
8600	5.7496	2.54233	24.8916	29.4340	5.05203	49.4638	8600
8800	5.7552	2.54144	24.9501	29.4915	5.05026	49.5799	8800
9000	5.7605	2.54060	25.0072	29.5478	5.04859	49.6934	9000
9200	5.7656	2.53981	25.0630	29.6028	5.04701	49.8043	9200
9400	5.7704	2.53906	25.1176	29.6567	5.04553	49.9129	9400
9600	5.7751	2.53837	25.1711	29.7094	5.04415	50.0191	9600
9800	5.7797	2.53772	25.2234	29.7611	5.04286	50.1231	9800
10000	5.7841	2.53712	25.2747	29.8119	5.04167	50.2249	10000
10200	5.7883	2.53652	25.3264	29.8622	5.04059	50.3249	10200
10400	5.7924	2.53596	25.3776	29.9122	5.03957	50.4231	10400
10600	5.7964	2.53543	25.4283	29.9619	5.03860	50.5197	10600
10800	5.8003	2.53493	25.4786	30.0112	5.03768	50.6149	10800
11000	5.8041	2.53445	25.5284	30.0602	5.03681	50.7091	11000
11200	5.8078	2.53399	25.5779	30.1089	5.03598	50.8024	11200
11400	5.8114	2.53355	25.6270	30.1572	5.03519	50.8949	11400
11600	5.8149	2.53312	25.6757	30.2052	5.03444	50.9866	11600
11800	5.8183	2.53270	25.7240	30.2529	5.03372	51.0775	11800
12000	5.8216	2.53229	25.7719	30.3002	5.03303	51.1679	12000
12200	5.8248	2.53189	25.8194	30.3472	5.03237	51.2578	12200
12400	5.8279	2.53150	25.8665	30.3939	5.03174	51.3473	12400
12600	5.8309	2.53112	25.9132	30.4402	5.03114	51.4364	12600
12800	5.8338	2.53075	25.9595	30.4862	5.03057	51.5251	12800
13000	5.8366	2.53039	26.0024	30.5319	5.03003	51.6134	13000
13200	5.8393	2.53004	26.0488	30.5772	5.02951	51.7014	13200
13400	5.8419	2.52970	26.0947	30.6222	5.02901	51.7891	13400
13600	5.8444	2.52937	26.1402	30.6669	5.02853	51.8764	13600
13800	5.8468	2.52905	26.1853	30.7113	5.02807	51.9634	13800
14000	5.8491	2.52874	26.2300	30.7554	5.02763	52.0501	14000
14200	5.8513	2.52844	26.2743	30.7992	5.02721	52.1364	14200
14400	5.8535	2.52815	26.3182	30.8427	5.02681	52.2224	14400
14600	5.8556	2.52787	26.3618	30.8859	5.02642	52.3081	14600
14800	5.8576	2.52760	26.4051	30.9288	5.02605	52.3936	14800
15000	5.8595	2.52734	26.4480	30.9714	5.02569	52.4789	15000

TABLE 17 (CONT.). IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0 - U}{RT}$	$\frac{H^0 - H}{RT}$	$\ln \frac{U^0 - U}{U^0}$	$\ln \frac{H^0 - H}{H^0}$	$\ln \frac{U^0 - U}{H^0 - H}$	$\ln \frac{U^0 - U}{U^0}$	$\ln \frac{H^0 - H}{H^0}$	$\ln \frac{U^0 - U}{H^0 - H}$	TEMP. (°K)
15000	5.8672	26.3026	28.8420	5.06411	52.2676	57.3317	4.58045	7.34728	7.86818	15000
15500	5.8750	26.3359	28.9276	5.05871	52.3332	57.4039	4.58086	7.34804	7.86818	15500
16000	5.8830	26.3686	29.0110	5.05313	52.3936	57.4697	4.58128	7.34880	7.86818	16000
16500	5.8914	26.4006	29.0925	5.04736	52.4493	57.5317	4.58169	7.34956	7.86818	16500
17000	5.9000	26.4319	29.1722	5.04144	52.5005	57.5900	4.58208	7.35032	7.86818	17000
17500	5.9091	26.4626	29.2502	5.03532	52.5476	57.6449	4.58246	7.35108	7.86818	17500
18000	5.9186	26.4928	29.3266	5.02900	52.5900	57.6960	4.58283	7.35184	7.86818	18000
18500	5.9287	26.5224	29.4015	5.02248	52.6280	57.7433	4.58319	7.35259	7.86818	18500
19000	5.9392	26.5515	29.4751	5.01576	52.6616	57.7868	4.58354	7.35334	7.86818	19000
19500	5.9503	26.5801	29.5476	5.00884	52.6909	57.8264	4.58389	7.35409	7.86818	19500
20000	5.9621	26.6082	29.6196	5.00172	52.7159	57.8621	4.58423	7.35483	7.86818	20000
20500	5.9746	26.6358	29.6911	4.99440	52.7366	57.8939	4.58456	7.35556	7.86818	20500
21000	5.9877	26.6630	29.7621	4.98687	52.7530	57.9217	4.58488	7.35628	7.86818	21000
21500	5.9999	26.6898	29.8326	4.97914	52.7651	57.9455	4.58520	7.35699	7.86818	21500
22000	6.0121	26.7161	29.9026	4.97121	52.7728	57.9653	4.58551	7.35769	7.86818	22000
22500	6.0243	26.7419	29.9721	4.96308	52.7761	57.9811	4.58582	7.35838	7.86818	22500
23000	6.0365	26.7672	30.0411	4.95475	52.7749	57.9929	4.58612	7.35906	7.86818	23000
23500	6.0487	26.7920	30.1096	4.94622	52.7692	57.9998	4.58641	7.35973	7.86818	23500
24000	6.0609	26.8163	30.1776	4.93759	52.7589	57.9998	4.58669	7.36039	7.86818	24000
24500	6.0731	26.8400	30.2451	4.92886	52.7441	57.9841	4.58696	7.36104	7.86818	24500
25000	6.0853	26.8637	30.3121	4.91993	52.7248	57.9529	4.58722	7.36168	7.86818	25000
25500	6.0975	26.8874	30.3786	4.91080	52.7011	57.9166	4.58747	7.36231	7.86818	25500
26000	6.1097	26.9111	30.4446	4.90147	52.6730	57.8753	4.58771	7.36293	7.86818	26000
26500	6.1219	26.9348	30.5101	4.89194	52.6406	57.8290	4.58794	7.36354	7.86818	26500
27000	6.1341	26.9585	30.5751	4.88221	52.6039	57.7777	4.58816	7.36414	7.86818	27000
27500	6.1463	26.9822	30.6396	4.87228	52.5629	57.7214	4.58837	7.36473	7.86818	27500
28000	6.1585	27.0059	30.7036	4.86215	52.5176	57.6601	4.58857	7.36531	7.86818	28000
28500	6.1707	27.0296	30.7671	4.85182	52.4681	57.5938	4.58876	7.36588	7.86818	28500
29000	6.1829	27.0533	30.8301	4.84129	52.4144	57.5225	4.58894	7.36644	7.86818	29000
29500	6.1951	27.0770	30.8926	4.83056	52.3566	57.4462	4.58911	7.36699	7.86818	29500
30000	6.2073	27.1007	30.9546	4.81963	52.2946	57.3650	4.58927	7.36753	7.86818	30000
30500	6.2195	27.1244	31.0161	4.80849	52.2283	57.2787	4.58942	7.36806	7.86818	30500
31000	6.2317	27.1481	31.0771	4.79716	52.1578	57.1874	4.58956	7.36858	7.86818	31000
31500	6.2439	27.1718	31.1376	4.78563	52.0831	57.0911	4.58969	7.36909	7.86818	31500
32000	6.2561	27.1955	31.1976	4.77390	52.0042	56.9898	4.58981	7.36959	7.86818	32000
32500	6.2683	27.2192	31.2571	4.76197	51.9211	56.8835	4.58992	7.37008	7.86818	32500
33000	6.2805	27.2429	31.3161	4.74984	51.8338	56.7722	4.59003	7.37056	7.86818	33000
33500	6.2927	27.2666	31.3746	4.73751	51.7424	56.6559	4.59013	7.37103	7.86818	33500
34000	6.3049	27.2903	31.4326	4.72498	51.6469	56.5356	4.59022	7.37149	7.86818	34000
34500	6.3171	27.3140	31.4901	4.71225	51.5474	56.4103	4.59031	7.37194	7.86818	34500
35000	6.3293	27.3377	31.5471	4.69932	51.4439	56.2800	4.59039	7.37238	7.86818	35000
35500	6.3415	27.3614	31.6036	4.68609	51.3364	56.1447	4.59046	7.37281	7.86818	35500
36000	6.3537	27.3851	31.6596	4.67262	51.2249	56.0054	4.59053	7.37323	7.86818	36000
36500	6.3659	27.4088	31.7151	4.65895	51.1094	55.8621	4.59059	7.37364	7.86818	36500
37000	6.3781	27.4325	31.7701	4.64508	50.9900	55.7148	4.59065	7.37405	7.86818	37000
37500	6.3903	27.4562	31.8246	4.63091	50.8665	55.5635	4.59070	7.37445	7.86818	37500
38000	6.4025	27.4799	31.8786	4.61644	50.7390	55.4082	4.59075	7.37484	7.86818	38000
38500	6.4147	27.5036	31.9321	4.60177	50.6075	55.2489	4.59079	7.37523	7.86818	38500
39000	6.4269	27.5273	31.9851	4.58690	50.4729	55.0856	4.59083	7.37561	7.86818	39000
39500	6.4391	27.5510	32.0376	4.57181	50.3354	54.9183	4.59086	7.37598	7.86818	39500
40000	6.4513	27.5747	32.0891	4.55652	50.1939	54.7470	4.59089	7.37635	7.86818	40000
40500	6.4635	27.5984	32.1401	4.54093	50.0494	54.5717	4.59091	7.37671	7.86818	40500
41000	6.4757	27.6221	32.1906	4.52504	49.9019	54.3924	4.59093	7.37707	7.86818	41000
41500	6.4879	27.6458	32.2406	4.50885	49.7514	54.2091	4.59094	7.37742	7.86818	41500
42000	6.5001	27.6695	32.2901	4.49236	49.5979	54.0218	4.59095	7.37777	7.86818	42000
42500	6.5123	27.6932	32.3391	4.47557	49.4414	53.8305	4.59095	7.37811	7.86818	42500
43000	6.5245	27.7169	32.3876	4.45848	49.2819	53.6352	4.59095	7.37845	7.86818	43000
43500	6.5367	27.7406	32.4356	4.44109	49.1194	53.4359	4.59094	7.37878	7.86818	43500
44000	6.5489	27.7643	32.4831	4.42340	48.9539	53.2326	4.59093	7.37911	7.86818	44000
44500	6.5611	27.7880	32.5301	4.40541	48.7854	53.0253	4.59091	7.37943	7.86818	44500
45000	6.5733	27.8117	32.5766	4.38712	48.6139	52.8140	4.59089	7.37975	7.86818	45000
45500	6.5855	27.8354	32.6226	4.36863	48.4394	52.5987	4.59086	7.38006	7.86818	45500
46000	6.5977	27.8591	32.6681	4.34984	48.2619	52.3794	4.59083	7.38037	7.86818	46000
46500	6.6099	27.8828	32.7131	4.33075	48.0814	52.1561	4.59079	7.38067	7.86818	46500
47000	6.6221	27.9065	32.7576	4.31136	47.8979	51.9288	4.59075	7.38096	7.86818	47000
47500	6.6343	27.9302	32.8016	4.29167	47.7114	51.6975	4.59070	7.38125	7.86818	47500
48000	6.6465	27.9539	32.8451	4.27168	47.5219	51.4622	4.59065	7.38153	7.86818	48000
48500	6.6587	27.9776	32.8881	4.25139	47.3294	51.2229	4.59059	7.38181	7.86818	48500
49000	6.6709	27.9999	32.9306	4.23080	47.1339	50.9796	4.59053	7.38208	7.86818	49000
49500	6.6831	28.0236	32.9726	4.20991	46.9374	50.7323	4.59046	7.38235	7.86818	49500
50000	6.6953	28.0473	33.0141	4.18872	46.7329	50.4810	4.59039	7.38261	7.86818	50000
50500	6.7075	28.0710	33.0551	4.16723	46.5254	50.2257	4.59031	7.38287	7.86818	50500
51000	6.7197	28.0947	33.0956	4.14544	46.3149	49.9664	4.59022	7.38312	7.86818	51000
51500	6.7319	28.1184	33.1356	4.12335	46.1014	49.7031	4.59013	7.38337	7.86818	51500
52000	6.7441	28.1421	33.1751	4.10096	45.8849	49.4358	4.59003	7.38361	7.86818	52000
52500	6.7563	28.1658	33.2141	4.07827	45.6654	49.1645	4.58992	7.38385	7.86818	52500
53000	6.7685	28.1895	33.2526	4.05528	45.4429	48.8892	4.58981	7.38408	7.86818	53000
53500	6.7807	28.2132	33.2906	4.03199	45.2174	48.6109	4.58969	7.38431	7.86818	53500
54000	6.7929	28.2369	33.3281	4.00840	44.9889	48.3286	4.58956	7.38453	7.86818	54000
54500	6.8051	28.2606	33.3651	3.98351	44.7594	48.0423	4.58942	7.38475	7.86818	54500
55000	6.8173	28.2843	33.4016	3.95832	44.5224	47.7520	4.58927	7.38496	7.86818	55000
55500	6.8295	28.3080	33.4376	3.93283	44.2779	47.4547	4.58911	7.38517	7.86818	55500
56000	6.8417	28.3317	33.4731	3.90704	44.0259	47.1574	4.58894	7.38537	7.86818	56000
56500	6.8539	28.3554	33.5081	3.88095	43.7664	46.8591	4.58876	7.38556	7.86818	56500
57000	6.8661	28.3791	33.5426	3.85456	43.5019	46.5598	4.58857	7.38575	7.86818	57000
57500	6.8783	28.4028	33.5766	3.82787	43.2344	46.2585	4.58837	7.38593	7.86818	57500
58000	6.8905	28.4265	33.6101	3.80088	42.9639	45.9552	4.58816	7.38611	7.86818	58000
58500	6.9027	28.4502	33.6431	3.77359	42.6904	45.6499	4.58794	7.38628	7.86818	58500
59000	6.9149	28.4739	33.6756	3.74590	42.4139	45.3426	4.58771	7.38645	7.86818	59000
59500	6.9271	28.4976	33.7076	3.71791	42.1344	45.0333	4.58747	7.38661	7.86818	59500
60000	6.9393	28.5213	33.7391	3.68952	41.8519	44.7220	4.58722	7.38677	7.86818	60000

TABLE 18. IDEAL GAS FUNCTIONS FOR AR 3+ (ATOMIC WEIGHT 39.9440, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 62 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT- FUNCT.	$\frac{h^2 E}{RT}$	$-\frac{h^2 E}{RT}$	$\ln \frac{h^2 E}{RT}$	$-\ln \frac{h^2 E}{RT}$	$\ln \frac{h^2 E}{RT}$	$-\ln \frac{h^2 E}{RT}$	$\ln \frac{h^2 E}{RT}$	$-\ln \frac{h^2 E}{RT}$	TEMP. (°K)
3000	4.0004	2.50099	23.2406	25.7496	4.96908	46.2307	51.2009	0.9402E 03	1.4916E 04	1.372E 05
3200	4.0007	2.50175	23.4301	25.9118	4.97150	46.5394	51.5308	1.5495E 03	1.5908E 04	1.4099E 05
3400	4.0013	2.50280	23.5818	26.0847	4.97366	46.8409	51.8446	1.6134E 04	1.6910E 04	1.5933E 05
3600	4.0021	2.50456	23.7259	26.2294	4.97635	47.1453	52.1221	1.6763E 04	1.7917E 04	1.6972E 05
3800	4.0033	2.50645	23.8604	26.3670	4.98114	47.4465	52.3956	1.7377E 04	1.8920E 04	1.8017E 05
4000	4.0050	2.50945	23.9900	26.4984	4.98648	47.7471	52.6548	1.7988E 04	1.9943E 04	1.9064E 05
4200	4.0071	2.51295	24.1115	26.6245	4.99364	48.0481	52.9072	1.8617E 04	2.0972E 04	2.0124E 05
4400	4.0099	2.51721	24.2285	26.7457	5.00217	48.3496	53.1542	1.9266E 04	2.2009E 04	2.1184E 05
4600	4.0134	2.52227	24.3405	26.8628	5.01217	48.6522	53.4006	1.9931E 04	2.3054E 04	2.2250E 05
4800	4.0177	2.52817	24.4480	26.9761	5.02339	48.9561	53.6461	1.4576E 04	2.4115E 04	2.3319E 05
5000	4.0229	2.53491	24.5513	27.0862	5.03728	49.2615	53.8918	1.5231E 04	2.5184E 04	2.4394E 05
5200	4.0290	2.54249	24.6509	27.1934	5.05324	49.5684	54.1377	1.5893E 04	2.6272E 04	2.5472E 05
5400	4.0361	2.55080	24.7470	27.2979	5.06964	49.8764	54.3844	1.6562E 04	2.7373E 04	2.6555E 05
5600	4.0442	2.56012	24.8399	27.4000	5.08738	49.3410	54.6404	1.7241E 04	2.8489E 04	2.7642E 05
5800	4.0535	2.57011	24.9299	27.5001	5.10723	49.5399	54.8971	1.7926E 04	2.9622E 04	2.8733E 05
6000	4.0638	2.58084	25.0172	27.5981	5.12855	49.7134	55.1540	1.8608E 04	3.0771E 04	2.9828E 05
6200	4.0754	2.59225	25.1021	27.6943	5.15122	49.8819	55.4072	1.9291E 04	3.1936E 04	3.0927E 05
6400	4.0881	2.60429	25.1845	27.7888	5.17515	50.0459	55.6597	2.0043E 04	3.3121E 04	3.2039E 05
6600	4.1020	2.61691	25.2649	27.8818	5.20022	50.2055	55.9116	2.0806E 04	3.4321E 04	3.3164E 05
6800	4.1172	2.63004	25.3432	27.9732	5.22633	50.3611	56.1626	2.1586E 04	3.5533E 04	3.4294E 05
7000	4.1335	2.64363	25.4196	28.0633	5.25334	50.5130	56.4125	2.2386E 04	3.6773E 04	3.5539E 05
7200	4.1511	2.65762	25.4943	28.1519	5.28113	50.6614	56.6605	2.3197E 04	3.8024E 04	3.6804E 05
7400	4.1699	2.67214	25.5673	28.2393	5.30959	50.8065	56.9111	2.4016E 04	3.9281E 04	3.8077E 05
7600	4.1898	2.68694	25.6388	28.3253	5.33860	50.9484	57.1603	2.4841E 04	4.0543E 04	3.9352E 05
7800	4.2110	2.70136	25.7087	28.4101	5.36804	51.0875	57.4078	2.5671E 04	4.1811E 04	4.0628E 05
8000	4.2333	2.71633	25.7773	28.4936	5.39780	51.2238	57.6526	2.6505E 04	4.3082E 04	4.1907E 05
8200	4.2568	2.73181	25.8446	28.5760	5.42776	51.3574	57.8952	2.7343E 04	4.4358E 04	4.3183E 05
8400	4.2813	2.74785	25.9106	28.6571	5.45794	51.4886	58.1364	2.8184E 04	4.5639E 04	4.4454E 05
8600	4.3070	2.76449	25.9754	28.7371	5.48794	51.6174	58.3759	2.9027E 04	4.6916E 04	4.5721E 05
8800	4.3338	2.77680	26.0390	28.8158	5.51796	51.7439	58.6139	2.9871E 04	4.8189E 04	4.6984E 05
9000	4.3615	2.79183	26.1016	28.8934	5.54782	51.8682	58.8504	3.0716E 04	4.9458E 04	4.8243E 05
9200	4.3903	2.80874	26.1631	28.9699	5.57745	51.9905	59.0859	3.1561E 04	5.0723E 04	4.9498E 05
9400	4.4201	2.82149	26.2237	29.0451	5.60677	52.1107	59.3199	3.2406E 04	5.1984E 04	5.0749E 05
9600	4.4508	2.83606	26.2832	29.1193	5.63573	52.2291	59.5526	3.3251E 04	5.3241E 04	5.2000E 05
9800	4.4824	2.85042	26.3418	29.1923	5.66426	52.3456	59.7849	3.4096E 04	5.4494E 04	5.3246E 05
10000	4.5149	2.86454	26.3994	29.2641	5.69231	52.4603	59.9964	3.4941E 04	5.5743E 04	5.4488E 05
10500	4.5997	2.89864	26.5402	29.4388	5.76087	52.7397	60.2489	3.6086E 04	5.7000E 04	5.5733E 05
11000	4.6893	2.93082	26.6758	29.6066	5.82403	53.0091	60.5014	3.7231E 04	5.8257E 04	5.6980E 05
11500	4.7832	2.96090	26.8067	29.7676	5.88360	53.2694	60.7539	3.8376E 04	5.9514E 04	5.8227E 05
12000	4.8809	2.98877	26.9333	29.9221	5.93919	53.5210	60.9964	3.9521E 04	6.0771E 04	5.9474E 05
12500	4.9919	3.01439	27.0559	30.0702	5.99009	53.7645	61.2389	4.0666E 04	6.2028E 04	6.0721E 05
13000	5.0958	3.03777	27.1745	30.2123	6.03655	54.0003	61.4814	4.1811E 04	6.3284E 04	6.1968E 05
13500	5.1921	3.05894	27.2896	30.3485	6.07845	54.2289	61.7239	4.2956E 04	6.4540E 04	6.3215E 05
14000	5.2904	3.07803	27.4012	30.4792	6.11644	54.4507	61.9664	4.4101E 04	6.5796E 04	6.4462E 05
14500	5.4109	3.09510	27.5095	30.6046	6.15047	54.6659	62.2089	4.5246E 04	6.7052E 04	6.5719E 05

TABLE 10 (CONT.). IDEAL GAS FUNCTIONS FOR AIR 34

TEMP. (°F.)	PARTIC. FUNCT.	$\frac{h^* - h}{RT}$	$\frac{h^* - h}{RT} - \frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT}$	$\ln \frac{h^* - h}{RT} - \ln \frac{h^* - h}{RT}$	$\frac{h^* - h}{RT} - \frac{h^* - h}{RT}$	$\frac{h^* - h}{RT} - \frac{h^* - h}{RT}$	TEMP. (°F.)				
13000	5.5226	3.11027	27.6157	30.7250	6.10662	54.8750	61.0556	6.2708E 04	9.2708E 04	9.2708E 04	8.2712E 05	15000
15000	5.6355	3.12367	27.7169	30.8466	6.20725	55.0781	61.2593	6.5411E 04	9.6421E 04	9.6421E 04	8.5371E 05	15500
16000	5.7493	3.13542	27.8163	30.9517	6.28061	55.2755	61.5061	6.7899E 04	9.9490E 04	9.9490E 04	8.8441E 05	16000
16500	5.8637	3.14566	27.9129	31.0586	6.34064	55.4676	61.7105	7.0352E 04	1.0314E 05	1.0314E 05	9.1527E 05	16500
17000	5.9784	3.15490	28.0070	31.1614	6.38951	55.6544	61.9230	7.2783E 04	1.0656E 05	1.0656E 05	9.4613E 05	17000
17500	6.0938	3.16204	28.0985	31.2606	6.42834	55.8354	62.1199	7.5187E 04	1.0994E 05	1.0994E 05	9.7714E 05	17500
18000	6.2091	3.16817	28.1877	31.3561	6.45828	56.0136	62.3098	7.7564E 04	1.1333E 05	1.1333E 05	1.0002E 06	18000
18500	6.3244	3.17383	28.2746	31.4486	6.48063	56.1862	62.4932	7.9914E 04	1.1668E 05	1.1668E 05	1.0304E 06	18500
19000	6.4394	3.17824	28.3593	31.5378	6.50510	56.3545	62.6702	8.2242E 04	1.2000E 05	1.2000E 05	1.0707E 06	19000
19500	6.5542	3.18181	28.4419	31.6237	6.52270	56.5187	62.8415	8.4543E 04	1.2332E 05	1.2332E 05	1.1021E 06	19500
20000	6.6686	3.18462	28.5225	31.7071	6.53837	56.6788	63.0072	8.6824E 04	1.2657E 05	1.2657E 05	1.1336E 06	20000
20500	6.7829	3.18696	28.6028	31.7893	6.55202	56.8350	63.1674	8.9092E 04	1.2976E 05	1.2976E 05	1.1647E 06	20500
21000	6.8968	3.18884	28.6818	31.8705	6.56483	56.9875	63.3221	9.1348E 04	1.3290E 05	1.3290E 05	1.1954E 06	21000
21500	7.0102	3.19027	28.7593	31.9507	6.57683	57.1364	63.4719	9.3592E 04	1.3599E 05	1.3599E 05	1.2257E 06	21500
22000	7.1231	3.19126	28.8354	32.0299	6.58805	57.2819	63.6164	9.5824E 04	1.3903E 05	1.3903E 05	1.2557E 06	22000
22500	7.2355	3.19181	28.9100	32.1081	6.59850	57.4241	63.7557	9.8044E 04	1.4203E 05	1.4203E 05	1.2854E 06	22500
23000	7.3474	3.19193	28.9831	32.1853	6.60818	57.5631	63.8899	1.0014E 05	1.4499E 05	1.4499E 05	1.3148E 06	23000
23500	7.4588	3.19162	29.0548	32.2615	6.61711	57.6988	64.0199	1.0216E 05	1.4791E 05	1.4791E 05	1.3439E 06	23500
24000	7.5698	3.19090	29.1251	32.3367	6.62529	57.8313	64.1457	1.0409E 05	1.5079E 05	1.5079E 05	1.3728E 06	24000
24500	7.6802	3.18977	29.1940	32.4109	6.63272	57.9607	64.2674	1.0603E 05	1.5363E 05	1.5363E 05	1.4015E 06	24500
25000	7.7901	3.18824	29.2615	32.4841	6.63940	58.0871	64.3850	1.0788E 05	1.5643E 05	1.5643E 05	1.4299E 06	25000
25500	7.9000	3.18631	29.3277	32.5563	6.64533	58.2105	64.4985	1.0964E 05	1.5919E 05	1.5919E 05	1.4581E 06	25500
26000	8.0100	3.18398	29.3925	32.6275	6.65061	58.3319	64.6089	1.1131E 05	1.6191E 05	1.6191E 05	1.4861E 06	26000
26500	8.1200	3.18125	29.4560	32.6977	6.65524	58.4513	64.7162	1.1290E 05	1.6459E 05	1.6459E 05	1.5139E 06	26500
27000	8.2300	3.17812	29.5181	32.7669	6.65931	58.5687	64.8205	1.1441E 05	1.6723E 05	1.6723E 05	1.5415E 06	27000
27500	8.3400	3.17459	29.5790	32.8351	6.66283	58.6841	64.9219	1.1586E 05	1.6983E 05	1.6983E 05	1.5689E 06	27500
28000	8.4500	3.17066	29.6387	32.9023	6.66589	58.7975	65.0205	1.1724E 05	1.7239E 05	1.7239E 05	1.5961E 06	28000
28500	8.5600	3.16633	29.6972	32.9685	6.66850	58.9089	65.1162	1.1856E 05	1.7491E 05	1.7491E 05	1.6231E 06	28500
29000	8.6700	3.16160	29.7545	33.0337	6.67066	59.0183	65.2099	1.1982E 05	1.7739E 05	1.7739E 05	1.6499E 06	29000
29500	8.7800	3.15647	29.8107	33.0979	6.67237	59.1257	65.3013	1.2103E 05	1.7983E 05	1.7983E 05	1.6765E 06	29500
30000	8.8900	3.15094	29.8659	33.1611	6.67363	59.2311	65.3905	1.2219E 05	1.8223E 05	1.8223E 05	1.7029E 06	30000
30500	8.9999	3.14501	29.9199	33.2233	6.67445	59.3345	65.4777	1.2330E 05	1.8459E 05	1.8459E 05	1.7291E 06	30500
31000	9.1099	3.13868	29.9728	33.2845	6.67483	59.4359	65.5629	1.2436E 05	1.8691E 05	1.8691E 05	1.7551E 06	31000
31500	9.2199	3.13195	29.9245	33.3447	6.67477	59.5353	65.6461	1.2527E 05	1.8919E 05	1.8919E 05	1.7809E 06	31500
32000	9.3299	3.12482	29.8751	33.4039	6.67427	59.6327	65.7275	1.2613E 05	1.9143E 05	1.9143E 05	1.8065E 06	32000
32500	9.4399	3.11729	29.8245	33.4621	6.67333	59.7281	65.8079	1.2695E 05	1.9363E 05	1.9363E 05	1.8319E 06	32500
33000	9.5499	3.10936	29.7728	33.5193	6.67195	59.8215	65.8873	1.2772E 05	1.9579E 05	1.9579E 05	1.8571E 06	33000
33500	9.6599	3.10103	29.7200	33.5755	6.67013	59.9129	65.9657	1.2845E 05	1.9791E 05	1.9791E 05	1.8821E 06	33500
34000	9.7699	3.09230	29.6661	33.6307	6.66787	59.9993	66.0431	1.2913E 05	1.9999E 05	1.9999E 05	1.9069E 06	34000
34500	9.8799	3.08317	29.6111	33.6849	6.66517	60.0827	66.1195	1.2976E 05	2.0203E 05	2.0203E 05	1.9315E 06	34500
35000	9.9899	3.07364	29.5550	33.7381	6.66203	60.1631	66.1949	1.3034E 05	2.0403E 05	2.0403E 05	1.9559E 06	35000
35500	10.0999	3.06371	29.4978	33.7903	6.65845	60.2405	66.2693	1.3087E 05	2.0600E 05	2.0600E 05	1.9799E 06	35500
36000	10.2099	3.05338	29.4395	33.8415	6.65443	60.3149	66.3427	1.3135E 05	2.0793E 05	2.0793E 05	2.0037E 06	36000
36500	10.3199	3.04265	29.3801	33.8917	6.65000	60.3863	66.4151	1.3178E 05	2.0983E 05	2.0983E 05	2.0273E 06	36500
37000	10.4299	3.03152	29.3196	33.9409	6.64517	60.4557	66.4865	1.3216E 05	2.1169E 05	2.1169E 05	2.0507E 06	37000
37500	10.5399	3.02000	29.2579	33.9891	6.63993	60.5231	66.5569	1.3249E 05	2.1351E 05	2.1351E 05	2.0739E 06	37500
38000	10.6499	3.00808	29.1951	34.0363	6.63429	60.5885	66.6263	1.3277E 05	2.1529E 05	2.1529E 05	2.0969E 06	38000
38500	10.7599	3.00000	29.1312	34.0825	6.62825	60.6519	66.6947	1.3300E 05	2.1703E 05	2.1703E 05	2.1197E 06	38500
39000	10.8699	2.99167	29.0663	34.1277	6.62181	60.7133	66.7621	1.3318E 05	2.1873E 05	2.1873E 05	2.1423E 06	39000
39500	10.9799	2.98300	29.0004	34.1719	6.61507	60.7727	66.8285	1.3331E 05	2.2039E 05	2.2039E 05	2.1647E 06	39500
40000	11.0899	2.97400	28.9335	34.2151	6.60793	60.8301	66.8939	1.3339E 05	2.2201E 05	2.2201E 05	2.1869E 06	40000
40500	11.1999	2.96467	28.8656	34.2573	6.60039	60.8855	66.9583	1.3342E 05	2.2359E 05	2.2359E 05	2.2089E 06	40500
41000	11.3099	2.95500	28.7967	34.2985	6.59245	60.9389	67.0217	1.3340E 05	2.2513E 05	2.2513E 05	2.2307E 06	41000
41500	11.4199	2.94500	28.7258	34.3387	6.58411	60.9903	67.0841	1.3333E 05	2.2663E 05	2.2663E 05	2.2523E 06	41500
42000	11.5299	2.93467	28.6539	34.3779	6.57537	61.0397	67.1455	1.3321E 05	2.2809E 05	2.2809E 05	2.2737E 06	42000
42500	11.6399	2.92400	28.5810	34.4161	6.56623	61.0871	67.2059	1.3304E 05	2.2951E 05	2.2951E 05	2.2949E 06	42500
43000	11.7499	2.91300	28.5081	34.4533	6.55669	61.1325	67.2653	1.3282E 05	2.3089E 05	2.3089E 05	2.3159E 06	43000
43500	11.8599	2.90167	28.4342	34.4895	6.54675	61.1759	67.3237	1.3255E 05	2.3223E 05	2.3223E 05	2.3367E 06	43500
44000	11.9699	2.89000	28.3593	34.5247	6.53641	61.2173	67.3811	1.3223E 05	2.3353E 05	2.3353E 05	2.3573E 06	44000
44500	12.0799	2.87800	28.2834	34.5589	6.52567	61.2567	67.4375	1.3186E 05	2.3479E 05	2.3479E 05	2.3777E 06	44500
45000	12.1899	2.86567	28.2065	34.5921	6.51453	61.2941	67.4929	1.3144E 05	2.3601E 05	2.3601E 05	2.3979E 06	45000
45500	12.2999	2.85300	28.1286	34.6243	6.50299	61.3295	67.5473	1.3097E 05	2.3719E 05	2.3719E 05	2.4179E 06	45500
46000	12.4099	2.84000	28.0497	34.6555	6.49105	61.3629	67.6007	1.3045E 05	2.3833E 05	2.3833E 05	2.4377E 06	46000
46500	12.5199	2.82667	27.9698	34.6857	6.47871	61.3943	67.6531	1.2988E 05	2.3943E 05	2.3943E 05	2.4573E 06	46500
47000	12.6299	2.81300	27.8889	34.7149	6.46597	61.4247	67.7045	1.2926E 05	2.4049E 05	2.4049E 05	2.4767E 06	47000
47500	12.7399	2.80000	27.8060	34.7431	6.45283	61.4531	67.7549	1.2859E 05	2.4151E 05	2.4151E 05	2.4959E 06	47500
48000	12.8499	2.78667	27.7221	34.7703	6.43929	61.4795	67.8043	1.2787E 05	2.4249E 05	2.4249E 05	2.5149E 06	48000
48500	12.9599	2.77300	27.6372	34.7965	6.42535	61.5039	67.8527	1.2710E 05	2.4343E 05	2.4343E 05	2.5337E 06	48500
49000	13.0699	2.75900	27.5513	34.8217	6.41101	61.5263	67.9001	1.2628E 05	2.4433E 05	2.4433E 05	2.5523E 06	49000
49500	13.1799	2.74467	27.4644	34.8469	6.39727	61.5467	67.9465	1.2541E 05	2.4519E 05	2.4519E 05	2.5707E 06	49500
50000	13.2899	2.73000	27.3765	34.8711	6.38313	61.5651	67.9919	1.2449E 05	2.4601E 05	2.4601E 05	2.5889E 06	50000

TABLE 19. IDEAL GAS FUNCTIONS FOR C 4+ (ATOMIC WEIGHT 12.0099, R = 1.987.7 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS n ≤ 6. SEE TABLE 43 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	$\frac{U^0 - U^0}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	21.3565	23.8565	4.96791	42.4399	47.4068	1.4904E 04	2.4040E 04	2.4040E 04	2.1219E 05	5000
5200	1.0000	2.50000	21.4546	23.9546	4.96791	42.5318	47.6017	1.5000E 04	2.5000E 04	2.5000E 04	2.2170E 05	5200
5400	1.0000	2.50000	21.5489	24.0489	4.96791	42.6212	47.7892	1.6094E 04	2.6094E 04	2.6094E 04	2.3123E 05	5400
5600	1.0000	2.50000	21.6398	24.1398	4.96791	43.0019	48.0748	1.6872E 04	2.7872E 04	2.7872E 04	2.4081E 05	5600
5800	1.0000	2.50000	21.7276	24.2276	4.96791	43.1762	48.1442	1.7280E 04	2.8814E 04	2.8814E 04	2.5042E 05	5800
6000	1.0000	2.50000	21.8123	24.3123	4.96791	43.3447	48.3126	1.7884E 04	2.9607E 04	2.9607E 04	2.6007E 05	6000
6200	1.0000	2.50000	21.8943	24.3943	4.96791	43.5076	48.4795	1.8481E 04	3.0007E 04	3.0007E 04	2.6973E 05	6200
6400	1.0000	2.50000	21.9737	24.4737	4.96791	43.6653	48.6332	1.9077E 04	3.1179E 04	3.1179E 04	2.7944E 05	6400
6600	1.0000	2.50000	22.0506	24.5506	4.96791	43.8182	48.7801	1.9673E 04	3.2708E 04	3.2708E 04	2.8920E 05	6600
6800	1.0000	2.50000	22.1252	24.6252	4.96791	43.9665	48.9344	2.0269E 04	3.3782E 04	3.3782E 04	2.9907E 05	6800
7000	1.0000	2.50000	22.1977	24.6977	4.96791	44.1105	49.0784	2.0865E 04	3.4775E 04	3.4775E 04	3.0877E 05	7000
7200	1.0000	2.50000	22.2681	24.7581	4.96791	44.2504	49.2183	2.1461E 04	3.5767E 04	3.5767E 04	3.1840E 05	7200
7400	1.0000	2.50000	22.3364	24.8184	4.96791	44.3865	49.3545	2.2058E 04	3.6758E 04	3.6758E 04	3.2804E 05	7400
7600	1.0000	2.50000	22.4033	24.8793	4.96791	44.5190	49.4869	2.2654E 04	3.7750E 04	3.7750E 04	3.3768E 05	7600
7800	1.0000	2.50000	22.4682	24.9382	4.96791	44.6481	49.6160	2.3250E 04	3.8750E 04	3.8750E 04	3.4732E 05	7800
8000	1.0000	2.50000	22.5315	25.0315	4.96791	44.7738	49.7418	2.3844E 04	3.9743E 04	3.9743E 04	3.5695E 05	8000
8200	1.0000	2.50000	22.5932	25.0932	4.96791	44.8965	49.8644	2.4442E 04	4.0737E 04	4.0737E 04	3.6658E 05	8200
8400	1.0000	2.50000	22.6533	25.1533	4.96791	45.0162	49.9841	2.5038E 04	4.1730E 04	4.1730E 04	3.7621E 05	8400
8600	1.0000	2.50000	22.7123	25.2123	4.96791	45.1331	50.1010	2.5634E 04	4.2724E 04	4.2724E 04	3.8584E 05	8600
8800	1.0000	2.50000	22.7698	25.2698	4.96791	45.2473	50.2153	2.6231E 04	4.3718E 04	4.3718E 04	3.9547E 05	8800
9000	1.0000	2.50000	22.8260	25.3260	4.96791	45.3590	50.3269	2.6827E 04	4.4711E 04	4.4711E 04	4.0510E 05	9000
9200	1.0000	2.50000	22.8809	25.3809	4.96791	45.4682	50.4361	2.7423E 04	4.5702E 04	4.5702E 04	4.1473E 05	9200
9400	1.0000	2.50000	22.9347	25.4347	4.96791	45.5750	50.5429	2.8019E 04	4.6690E 04	4.6690E 04	4.2436E 05	9400
9600	1.0000	2.50000	22.9873	25.4873	4.96791	45.6796	50.6475	2.8615E 04	4.7672E 04	4.7672E 04	4.3399E 05	9600
9800	1.0000	2.50000	23.0389	25.5389	4.96791	45.7820	50.7500	2.9211E 04	4.8664E 04	4.8664E 04	4.4362E 05	9800
10000	1.0000	2.50000	23.0894	25.5894	4.96791	45.8826	50.8503	2.9807E 04	4.9679E 04	4.9679E 04	4.5325E 05	10000
10500	1.0000	2.50000	23.2113	25.7113	4.96791	46.1248	51.0927	3.1298E 04	5.2163E 04	5.2163E 04	4.6431E 05	10500
11000	1.0000	2.50000	23.3276	25.8276	4.96791	46.3599	51.3238	3.2788E 04	5.4697E 04	5.4697E 04	4.7537E 05	11000
11500	1.0000	2.50000	23.4388	25.9388	4.96791	46.5787	51.5446	3.4279E 04	5.7131E 04	5.7131E 04	4.8643E 05	11500
12000	1.0000	2.50000	23.5452	26.0452	4.96791	46.7882	51.7561	3.5769E 04	5.9615E 04	5.9615E 04	4.9749E 05	12000
12500	1.0000	2.50000	23.6472	26.1472	4.96791	46.9910	51.9589	3.7259E 04	6.2099E 04	6.2099E 04	5.0855E 05	12500
13000	1.0000	2.50000	23.7453	26.2453	4.96791	47.1858	52.1537	3.8750E 04	6.4583E 04	6.4583E 04	5.1961E 05	13000
13500	1.0000	2.50000	23.8396	26.3396	4.96791	47.3733	52.3412	4.0240E 04	6.7067E 04	6.7067E 04	5.3067E 05	13500
14000	1.0000	2.50000	23.9306	26.4306	4.96791	47.5540	52.5219	4.1730E 04	6.9551E 04	6.9551E 04	5.4173E 05	14000
14500	1.0000	2.50000	24.0183	26.5183	4.96791	47.7283	52.6962	4.3221E 04	7.2035E 04	7.2035E 04	5.5279E 05	14500
15000	1.0000	2.50000	24.1030	26.6030	4.96791	47.8967	52.8644	4.4711E 04	7.4519E 04	7.4519E 04	5.6385E 05	15000
15500	1.0000	2.50000	24.1850	26.6850	4.96791	48.0596	53.0275	4.6202E 04	7.7003E 04	7.7003E 04	5.7491E 05	15500
16000	1.0000	2.50000	24.2644	26.7644	4.96791	48.2173	53.1853	4.7692E 04	7.9487E 04	7.9487E 04	5.8597E 05	16000
16500	1.0000	2.50000	24.3413	26.8413	4.96791	48.3702	53.3381	4.9182E 04	8.1971E 04	8.1971E 04	5.9703E 05	16500
17000	1.0000	2.50000	24.4159	26.9159	4.96791	48.5185	53.4864	5.0673E 04	8.4455E 04	8.4455E 04	6.0809E 05	17000
17500	1.0000	2.50000	24.4884	26.9884	4.96791	48.6625	53.6304	5.2163E 04	8.6938E 04	8.6938E 04	6.1915E 05	17500
18000	1.0000	2.50000	24.5588	27.0588	4.96791	48.8025	53.7704	5.3653E 04	8.9422E 04	8.9422E 04	6.3021E 05	18000
18500	1.0000	2.50000	24.6273	27.1273	4.96791	48.9386	53.9045	5.5143E 04	9.1906E 04	9.1906E 04	6.4127E 05	18500
19000	1.0000	2.50000	24.6940	27.1940	4.96791	49.0711	54.0390	5.6634E 04	9.4390E 04	9.4390E 04	6.5233E 05	19000
19500	1.0000	2.50000	24.7589	27.2589	4.96791	49.2001	54.1640	5.8123E 04	9.6874E 04	9.6874E 04	6.6339E 05	19500

TABLE 19 (CONT.). IDEAL GAS FUNCTIONS FOR C₄

TEMP. (°K)	PARTIAL FUNCT.	$\frac{H^0 - E^0}{RT}$	$-\frac{S^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT}$	$\ln \frac{H^0 - E^0}{RT} - \frac{S^0 - E^0}{RT}$	$\frac{H^0 - E^0}{RT}$	$\frac{H^0 - E^0}{RT} - \frac{S^0 - E^0}{RT}$	$\frac{H^0 - E^0}{RT}$	$\frac{H^0 - E^0}{RT} - \frac{S^0 - E^0}{RT}$	TEMP. (°K)
20000	1.0000	2.50000	24.8222	4.96791	49.3259	56.2938	5.96135	9.9358E 04	9.8652E 05	20000
22000	1.0000	2.50000	25.0605	4.96791	49.7994	56.7673	5.95176E 04	1.0929E 05	1.0929E 05	22000
24000	1.0000	2.50000	25.2780	4.96791	50.2317	57.1996	5.9388E 04	1.1923E 05	1.2054E 06	24000
26000	1.0000	2.50000	25.4782	4.96791	50.6293	57.5972	5.9229E 04	1.2917E 05	1.3164E 06	26000
28000	1.0000	2.50000	25.6634	4.96791	50.9975	57.9654	5.9041E 04	1.3910E 05	1.4279E 06	28000
30000	1.0000	2.50000	25.8359	4.96791	51.3402	58.3081	5.8822E 04	1.4904E 05	1.5402E 06	30000
32000	1.0000	2.50000	25.9973	4.96791	51.6608	58.6288	5.8584E 04	1.5897E 05	1.6531E 06	32000
34000	1.0000	2.50000	26.1488	4.96791	51.9620	58.9299	5.8329E 05	1.6891E 05	1.7667E 06	34000
36000	1.0000	2.50000	26.2917	4.96791	52.2460	59.2139	5.8051E 05	1.7884E 05	1.8807E 06	36000
38000	1.0000	2.50000	26.4269	4.96791	52.5146	59.4825	5.7752E 05	1.8878E 05	1.9956E 06	38000
40000	1.0000	2.50000	26.5551	4.96791	52.7694	59.7373	5.7433E 05	1.9872E 05	2.1108E 06	40000
42000	1.0000	2.50000	26.6771	4.96791	53.0118	59.9797	5.7095E 05	2.0865E 05	2.2265E 06	42000
44000	1.0000	2.50000	26.7934	4.96791	53.2429	60.2108	5.6748E 05	2.1859E 05	2.3427E 06	44000
46000	1.0000	2.50000	26.9045	4.96791	53.4637	60.4316	5.6392E 05	2.2852E 05	2.4593E 06	46000
48000	1.0000	2.50000	27.0109	4.96791	53.6752	60.6431	5.6027E 05	2.3846E 05	2.5764E 06	48000
50000	1.0000	2.50000	27.1130	4.96791	53.8780	60.8459	5.5654E 05	2.4840E 05	2.6939E 06	50000
60000	1.0000	2.50000	27.5688	4.96791	54.7837	61.7516	5.4784E 05	2.9807E 05	3.2870E 06	60000
70000	1.0000	2.50000	27.9541	4.96791	55.5495	62.5174	5.3924E 05	3.4772E 05	3.8805E 06	70000
80000	1.0000	2.50000	28.2880	4.96791	56.2129	63.1808	5.3064E 05	3.9735E 05	4.4730E 06	80000
90000	1.0000	2.50000	28.5824	4.96791	56.7980	63.7659	5.2204E 05	4.4698E 05	5.0655E 06	90000
100000	1.0000	2.50000	28.8458	4.96791	57.3214	64.2894	5.1344E 05	4.9667E 05	5.6580E 06	100000
150000	1.0000	2.50000	29.8995	4.96791	59.3358	66.3037	4.8711E 05	7.4519E 05	8.9054E 06	150000
200000	1.0000	2.50000	30.5187	4.96791	60.7649	67.7329	4.7851E 05	9.9359E 05	1.2153E 07	200000
300000	1.0002	2.50257	31.5926	4.97302	62.7797	69.7527	4.6991E 05	1.4919E 06	1.8834E 07	300000
400000	1.0050	2.50409	32.3165	5.06348	64.2183	71.2818	4.6131E 05	2.0254E 06	2.5687E 07	400000
500000	1.0352	2.76861	32.9041	5.50163	65.3858	72.8875	4.5271E 05	2.7508E 06	3.2693E 07	500000
600000	1.1321	3.27455	33.4493	6.30787	66.4654	74.5022	4.4411E 05	3.9047E 06	4.9697E 07	600000
800000	1.7016	4.57624	34.5760	9.09454	68.7082	77.8028	4.3551E 05	7.2756E 06	5.4967E 07	800000
1000000	2.9272	5.16922	35.6763	10.27209	70.8948	81.1669	4.2691E 05	1.0272E 07	7.0895E 07	1000000
1500000	6.4832	4.90217	37.7541	42.6562	9.74143	75.0235	4.1831E 05	1.4612E 07	1.1254E 08	1500000
2000000	15.8002	4.41968	39.0952	43.5149	8.76264	77.6886	4.0971E 05	1.7565E 07	1.5533E 08	2000000
3000000	30.3378	3.82347	40.7612	44.5867	7.60184	80.9993	4.0111E 05	2.2806E 07	2.4300E 08	3000000
4000000	42.3389	3.50524	41.8137	45.3190	6.96548	83.0908	3.9251E 05	2.7862E 07	3.3256E 08	4000000
5000000	51.7954	3.30846	42.5732	45.6817	6.47445	84.6000	3.8391E 05	3.2812E 07	4.2300E 08	5000000
6000000	59.2790	3.17578	43.1640	46.3397	6.31081	85.7739	3.7531E 05	3.7865E 07	5.1464E 08	6000000
8000000	70.2102	3.00856	44.0524	47.0410	5.97850	91.5179	3.6671E 05	4.7023E 07	7.0032E 08	8000000
10000000	77.7344	2.90759	44.7121	47.6196	5.77785	94.6281	3.5811E 05	5.7779E 07	8.8850E 08	10000000

TABLE 20. IDEAL GAS FUNCTIONS FOR N₂ (INTRINSIC HEIGHT 14.0045, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N=4. SEE TABLE 64 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 - \epsilon_0^2}{RT}$	$\frac{h^2 - \epsilon_0^2}{RT}$	$\frac{h^2 - \epsilon_0^2}{RT}$	$\frac{h^2 - \epsilon_0^2}{RT}$	$\frac{h^2 - \epsilon_0^2}{RT}$	$\frac{h^2 - \epsilon_0^2}{RT}$	$\frac{h^2 - \epsilon_0^2}{RT}$	$\frac{h^2 - \epsilon_0^2}{RT}$	$\frac{h^2 - \epsilon_0^2}{RT}$	TEMP. (°K)
9000	2.0000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	9000
9200	2.0000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	9200
9400	2.0000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	9400
9600	2.0000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	9600
9800	2.0000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	9800
10000	2.0000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	2.50000	10000
10500	2.0001	2.50032	2.50032	2.50032	2.50032	2.50032	2.50032	2.50032	2.50032	2.50032	10500
11000	2.0002	2.50083	2.50083	2.50083	2.50083	2.50083	2.50083	2.50083	2.50083	2.50083	11000
11500	2.0002	2.50126	2.50126	2.50126	2.50126	2.50126	2.50126	2.50126	2.50126	2.50126	11500
12000	2.0004	2.50183	2.50183	2.50183	2.50183	2.50183	2.50183	2.50183	2.50183	2.50183	12000
12500	2.0006	2.50259	2.50259	2.50259	2.50259	2.50259	2.50259	2.50259	2.50259	2.50259	12500
13000	2.0008	2.50356	2.50356	2.50356	2.50356	2.50356	2.50356	2.50356	2.50356	2.50356	13000
13500	2.0011	2.50477	2.50477	2.50477	2.50477	2.50477	2.50477	2.50477	2.50477	2.50477	13500
14000	2.0015	2.50625	2.50625	2.50625	2.50625	2.50625	2.50625	2.50625	2.50625	2.50625	14000
14500	2.0020	2.50803	2.50803	2.50803	2.50803	2.50803	2.50803	2.50803	2.50803	2.50803	14500
15000	2.0026	2.51014	2.51014	2.51014	2.51014	2.51014	2.51014	2.51014	2.51014	2.51014	15000
15500	2.0034	2.51256	2.51256	2.51256	2.51256	2.51256	2.51256	2.51256	2.51256	2.51256	15500
16000	2.0043	2.51540	2.51540	2.51540	2.51540	2.51540	2.51540	2.51540	2.51540	2.51540	16000
16500	2.0053	2.51859	2.51859	2.51859	2.51859	2.51859	2.51859	2.51859	2.51859	2.51859	16500
17000	2.0065	2.52216	2.52216	2.52216	2.52216	2.52216	2.52216	2.52216	2.52216	2.52216	17000
17500	2.0079	2.52616	2.52616	2.52616	2.52616	2.52616	2.52616	2.52616	2.52616	2.52616	17500
18000	2.0095	2.53055	2.53055	2.53055	2.53055	2.53055	2.53055	2.53055	2.53055	2.53055	18000
18500	2.0113	2.53535	2.53535	2.53535	2.53535	2.53535	2.53535	2.53535	2.53535	2.53535	18500
19000	2.0134	2.54056	2.54056	2.54056	2.54056	2.54056	2.54056	2.54056	2.54056	2.54056	19000
19500	2.0156	2.54616	2.54616	2.54616	2.54616	2.54616	2.54616	2.54616	2.54616	2.54616	19500

TABLE 20 (C.C.I.). IDEAL GAS FUNCTIONS FOR H₂

TEMP. (°K)	PARTIAL PRESSURE (atm)	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{h^2}{RT_0}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT_0}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT_0} - \frac{h^2}{RT_0}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT_0} - \frac{h^2}{RT_0} - \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT_0} - \frac{h^2}{RT_0} - \frac{h^2}{RT} - \frac{h^2}{RT^2}$	TEMP. (°K)
2000	2.0181	2.55216	25.7550	28.3072	5.07157	51.1795	56.2510	2000
2200	2.0308	2.57985	25.9995	28.5794	5.12660	51.6533	56.7919	2200
2400	2.0477	2.61266	26.2254	28.8380	5.19178	52.1141	57.3059	2400
2600	2.0692	2.64926	26.4359	29.0852	5.26552	52.5325	57.7971	2600
2800	2.0952	2.68827	26.6337	29.3219	5.34203	52.9255	58.2675	2800
3000	2.1255	2.72832	26.8205	29.5488	5.42163	53.2948	58.7104	3000
3200	2.1598	2.76925	26.9979	29.7661	5.50497	53.6432	59.1502	3200
3400	2.1978	2.81098	27.1669	29.9739	5.59114	53.9850	59.5832	3400
3600	2.2391	2.85410	27.3284	30.1725	5.68019	54.3200	59.9977	3600
3800	2.2833	2.89777	27.4831	30.3618	5.77200	54.6414	60.3940	3800
4000	2.3300	2.94198	27.6316	30.5423	5.86642	54.9505	60.7827	4000
4200	2.3789	2.98674	27.7743	30.7142	5.96341	55.2481	61.1643	4200
4400	2.4295	3.03205	27.9117	30.8777	6.06293	55.5343	61.5394	4400
4600	2.4817	3.07790	28.0441	31.0337	6.16503	55.8093	61.9080	4600
4800	2.5351	3.12429	28.1717	31.1820	6.26965	56.0739	62.2701	4800
5000	2.5894	3.17122	28.2950	31.3233	6.37679	56.3288	62.6255	5000
5200	2.6448	3.21869	28.4139	31.4580	6.48645	56.5743	62.9742	5200
5400	2.7013	3.26670	28.5285	31.5867	6.59863	56.8106	63.3162	5400
5600	2.7588	3.31525	28.6389	31.7095	6.71333	57.0379	63.6516	5600
5800	2.8173	3.36435	28.7452	31.8267	6.83055	57.2563	63.9804	5800
6000	2.8768	3.41400	28.8475	31.9385	6.95029	57.4658	64.3026	6000
6200	2.9373	3.46420	28.9458	32.0450	7.07255	57.6665	64.6181	6200
6400	2.9988	3.51495	29.0401	32.1473	7.19733	57.8585	64.9270	6400
6600	3.0613	3.56625	29.1314	32.2456	7.32463	58.0418	65.2294	6600
6800	3.1248	3.61810	29.2197	32.3400	7.45445	58.2165	65.5253	6800
7000	3.1893	3.67050	29.3050	32.4315	7.58680	58.3827	65.8147	7000
7200	3.2548	3.72345	29.3873	32.5199	7.72169	58.5404	66.0976	7200
7400	3.3213	3.77695	29.4666	32.6053	7.85913	58.6897	66.3740	7400
7600	3.3888	3.83100	29.5429	32.6878	7.99913	58.8307	66.6449	7600
7800	3.4573	3.88560	29.6162	32.7673	8.14169	58.9633	66.9093	7800
8000	3.5268	3.94075	29.6865	32.8438	8.28681	59.0876	67.1673	8000
8200	3.5973	3.99645	29.7538	32.9173	8.43449	59.2037	67.4189	8200
8400	3.6688	4.05270	29.8181	32.9878	8.58473	59.3116	67.6641	8400
8600	3.7413	4.10950	29.8794	33.0553	8.73753	59.4113	67.9029	8600
8800	3.8148	4.16685	29.9377	33.1198	8.89289	59.5028	68.1353	8800
9000	3.8893	4.22475	29.9930	33.1813	9.05081	59.5861	68.3613	9000
9200	3.9648	4.28320	30.0453	33.2400	9.21129	59.6613	68.5809	9200
9400	4.0413	4.34220	30.0946	33.2959	9.37433	59.7284	68.7941	9400
9600	4.1188	4.40175	30.1409	33.3490	9.53993	59.7875	68.9999	9600
9800	4.1973	4.46185	30.1842	33.4003	9.70809	59.8386	69.1984	9800
10000	4.2768	4.52250	30.2245	33.4488	9.87881	59.8817	69.3897	10000
10200	4.3573	4.58370	30.2618	33.4945	10.05209	59.9168	69.5739	10200
10400	4.4388	4.64545	30.2961	33.5373	10.22793	59.9439	69.7511	10400
10600	4.5213	4.70775	30.3274	33.5773	10.40633	59.9630	69.9214	10600
10800	4.6048	4.77060	30.3557	33.6145	10.58729	59.9741	70.0847	10800
11000	4.6893	4.83400	30.3810	33.6488	10.77081	59.9772	70.2411	11000
11200	4.7748	4.89795	30.4033	33.6803	10.95689	59.9723	70.3905	11200
11400	4.8613	4.96245	30.4226	33.7090	11.14553	59.9594	70.5329	11400
11600	4.9488	5.02750	30.4389	33.7349	11.33673	59.9385	70.6683	11600
11800	5.0373	5.09310	30.4522	33.7580	11.53049	59.9096	70.7967	11800
12000	5.1268	5.15925	30.4625	33.7783	11.72681	59.8727	70.9181	12000
12200	5.2173	5.22595	30.4698	33.7958	11.92569	59.8278	71.0325	12200
12400	5.3088	5.29320	30.4741	33.8105	12.12713	59.7749	71.1400	12400
12600	5.4013	5.36095	30.4754	33.8223	12.33113	59.7140	71.2405	12600
12800	5.4948	5.42920	30.4737	33.8313	12.53769	59.6451	71.3340	12800
13000	5.5893	5.49795	30.4690	33.8375	12.74681	59.5682	71.4205	13000
13200	5.6848	5.56720	30.4613	33.8410	12.95849	59.4833	71.5000	13200
13400	5.7813	5.63695	30.4506	33.8418	13.17273	59.3904	71.5725	13400
13600	5.8788	5.70720	30.4369	33.8399	13.38953	59.2895	71.6380	13600
13800	5.9773	5.77795	30.4202	33.8353	13.60889	59.1806	71.6965	13800
14000	6.0768	5.84920	30.4005	33.8280	13.83081	59.0637	71.7480	14000
14200	6.1773	5.92095	30.3778	33.8179	14.05529	58.9388	71.7925	14200
14400	6.2788	5.99320	30.3521	33.8050	14.28233	58.8059	71.8290	14400
14600	6.3813	6.06595	30.3234	33.7893	14.51193	58.6650	71.8575	14600
14800	6.4848	6.13920	30.2917	33.7708	14.74409	58.5161	71.8780	14800
15000	6.5893	6.21295	30.2570	33.7493	14.97881	58.3592	71.8905	15000
15200	6.6948	6.28720	30.2193	33.7248	15.21609	58.1943	71.8950	15200
15400	6.8013	6.36195	30.1786	33.6973	15.45593	58.0214	71.8915	15400
15600	6.9088	6.43720	30.1349	33.6668	15.69833	57.8405	71.8790	15600
15800	7.0173	6.51295	30.0882	33.6333	15.94329	57.6516	71.8575	15800
16000	7.1268	6.58920	30.0385	33.5968	16.19081	57.4547	71.8270	16000
16200	7.2373	6.66595	29.9858	33.5573	16.44089	57.2498	71.7875	16200
16400	7.3488	6.74320	29.9291	33.5148	16.69353	57.0369	71.7390	16400
16600	7.4613	6.82095	29.8684	33.4693	16.94873	56.8160	71.6815	16600
16800	7.5748	6.89920	29.8037	33.4208	17.20649	56.5881	71.6150	16800
17000	7.6893	6.97795	29.7350	33.3693	17.46681	56.3532	71.5395	17000
17200	7.8048	7.05720	29.6623	33.3148	17.72969	56.1113	71.4550	17200
17400	7.9213	7.13695	29.5866	33.2573	18.00009	55.8624	71.3615	17400
17600	8.0388	7.21720	29.5079	33.1968	18.26801	55.6065	71.2590	17600
17800	8.1573	7.29795	29.4252	33.1333	18.53343	55.3436	71.1475	17800
18000	8.2768	7.37920	29.3385	33.0668	18.79633	55.0737	71.0270	18000
18200	8.3973	7.46095	29.2478	32.9973	19.05673	54.7968	70.8975	18200
18400	8.5188	7.54320	29.1531	32.9248	19.31463	54.5129	70.7590	18400
18600	8.6413	7.62595	29.0554	32.8493	19.56993	54.2210	70.6115	18600
18800	8.7648	7.70920	28.9547	32.7708	19.82273	53.9221	70.4550	18800
19000	8.8893	7.79295	28.8500	32.6893	20.07303	53.6162	70.2895	19000
19200	9.0148	7.87720	28.7423	32.6048	20.32083	53.3033	70.1150	19200
19400	9.1413	7.96195	28.6316	32.5173	20.56613	52.9834	69.9315	19400
19600	9.2688	8.04720	28.5179	32.4268	20.80893	52.6565	69.7390	19600
19800	9.3973	8.13295	28.4012	32.3333	21.04923	52.3226	69.5375	19800
20000	9.5268	8.21920	28.2815	32.2368	21.28603	51.9817	69.3270	20000

TABLE 71. IDEAL GAS FUNCTIONS FOR 0 ∞ (ATOMIC WEIGHT 15.9972, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N S ∞ . SEE TABLE 65 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNC.	$\ln \frac{q}{N}$	$\ln \frac{q}{N} - \frac{E^0}{RT}$	$\frac{E^0}{RT}$	$\frac{E^0}{RT} - \frac{E^0}{RT} - \frac{E^0}{RT}$	$\frac{E^0}{RT} - \frac{E^0}{RT} - \frac{E^0}{RT}$	$\frac{E^0}{RT} - \frac{E^0}{RT} - \frac{E^0}{RT}$	$\frac{E^0}{RT} - \frac{E^0}{RT} - \frac{E^0}{RT}$	$\frac{E^0}{RT} - \frac{E^0}{RT} - \frac{E^0}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	21.7866	24.2666	4.96791	43.2937	48.2616	1.4904E 04	2.4840E 04	2.1647E 05
5200	1.0000	2.50000	21.8867	24.3667	4.96791	43.4885	48.4564	1.5000E 04	2.4883E 04	2.2614E 05
5400	1.0000	2.50000	21.9791	24.4791	4.96791	43.6760	48.6439	1.5096E 04	2.4927E 04	2.3585E 05
5600	1.0000	2.50000	22.0700	24.5700	4.96791	43.8567	48.8246	1.5188E 04	2.4970E 04	2.4560E 05
5800	1.0000	2.50000	22.1577	24.6577	4.96791	44.0310	49.0000	1.5276E 04	2.5011E 04	2.5538E 05
6000	1.0000	2.50000	22.2425	24.7425	4.96791	44.1994	49.1673	1.5360E 04	2.5050E 04	2.6520E 05
6200	1.0000	2.50000	22.3244	24.8244	4.96792	44.3623	49.3302	1.5441E 04	2.5087E 04	2.7505E 05
6400	1.0000	2.50000	22.4038	24.9038	4.96792	44.5201	49.4880	1.5519E 04	2.5122E 04	2.8493E 05
6600	1.0000	2.50000	22.4807	24.9807	4.96792	44.6728	49.6408	1.5594E 04	2.5156E 04	2.9484E 05
6800	1.0000	2.50000	22.5554	25.0554	4.96792	44.8212	49.7892	1.5667E 04	2.5188E 04	3.0478E 05
7000	1.0000	2.50001	22.6278	25.1278	4.96793	44.9652	49.9332	1.5738E 04	2.5219E 04	3.1474E 05
7200	1.0000	2.50001	22.6983	25.1983	4.96793	45.1052	50.0731	1.5807E 04	2.5248E 04	3.2474E 05
7400	1.0000	2.50002	22.7668	25.2668	4.96794	45.2413	50.2092	1.5874E 04	2.5275E 04	3.3479E 05
7600	1.0000	2.50002	22.8334	25.3334	4.96794	45.3738	50.3418	1.5939E 04	2.5301E 04	3.4484E 05
7800	1.0000	2.50003	22.8984	25.3984	4.96798	45.5028	50.4708	1.6002E 04	2.5325E 04	3.5493E 05
8000	1.0000	2.50005	22.9617	25.4617	4.96801	45.6286	50.5966	1.6063E 04	2.5347E 04	3.6503E 05
8200	1.0000	2.50007	23.0234	25.5235	4.96805	45.7513	50.7193	1.6122E 04	2.5368E 04	3.7514E 05
8400	1.0000	2.50009	23.0836	25.5837	4.96810	45.8710	50.8391	1.6179E 04	2.5387E 04	3.8527E 05
8600	1.0000	2.50011	23.1425	25.6426	4.96817	45.9879	50.9564	1.6234E 04	2.5405E 04	3.9542E 05
8800	1.0000	2.50017	23.1995	25.7001	4.96825	46.1021	51.0704	1.6287E 04	2.5422E 04	4.0558E 05
9000	1.0000	2.50022	23.2551	25.7564	4.96836	46.2133	51.1821	1.6338E 04	2.5438E 04	4.1576E 05
9200	1.0000	2.50029	23.3111	25.8114	4.96850	46.3230	51.2915	1.6387E 04	2.5453E 04	4.2597E 05
9400	1.0000	2.50036	23.3649	25.8652	4.96866	46.4298	51.3985	1.6434E 04	2.5467E 04	4.3621E 05
9600	1.0000	2.50048	23.4175	25.9180	4.96887	46.5344	51.5033	1.6479E 04	2.5480E 04	4.4647E 05
9800	1.0001	2.50061	23.4691	25.9697	4.96912	46.6365	51.6060	1.6522E 04	2.5492E 04	4.5674E 05
10000	1.0001	2.50076	23.5196	26.0203	4.96942	46.7373	51.7067	1.6563E 04	2.5503E 04	4.6703E 05
10500	1.0001	2.50127	23.6416	26.1429	4.97043	46.9798	51.9502	1.6603E 04	2.5514E 04	4.7734E 05
11000	1.0002	2.50202	23.7580	26.2600	4.97193	47.2110	52.1830	1.6642E 04	2.5524E 04	4.8767E 05
11500	1.0003	2.50309	23.8692	26.3723	4.97405	47.4321	52.4067	1.6679E 04	2.5533E 04	4.9802E 05
12000	1.0005	2.50454	23.9758	26.4803	4.97694	47.6438	52.6208	1.6715E 04	2.5542E 04	5.0838E 05
12500	1.0007	2.50648	24.0781	26.5845	4.98078	47.8471	52.8279	1.6750E 04	2.5550E 04	5.1875E 05
13000	1.0010	2.50897	24.1764	26.6854	4.98573	48.0425	53.0283	1.6784E 04	2.5557E 04	5.2913E 05
13500	1.0014	2.51210	24.2712	26.7833	4.99196	48.2308	53.2228	1.6817E 04	2.5564E 04	5.3952E 05
14000	1.0019	2.51596	24.3626	26.8785	4.99963	48.4125	53.4131	1.6849E 04	2.5570E 04	5.4992E 05
14500	1.0025	2.52063	24.4510	26.9716	5.00890	48.5881	53.5970	1.6880E 04	2.5576E 04	5.6033E 05
15000	1.0033	2.52617	24.5365	27.0627	5.01992	48.7591	53.7780	1.6910E 04	2.5581E 04	5.7075E 05
15500	1.0043	2.53285	24.6194	27.1521	5.03280	48.9229	53.9557	1.6939E 04	2.5586E 04	5.8118E 05
16000	1.0054	2.54014	24.7000	27.2401	5.04767	49.0828	54.1306	1.6967E 04	2.5590E 04	5.9162E 05
16500	1.0068	2.54866	24.7782	27.3269	5.06461	49.2391	54.3031	1.6994E 04	2.5594E 04	6.0207E 05
17000	1.0084	2.55826	24.8545	27.4127	5.08369	49.3899	54.4736	1.7020E 04	2.5598E 04	6.1253E 05
17500	1.0103	2.56897	24.9288	27.4977	5.10496	49.5376	54.6426	1.7045E 04	2.5602E 04	6.2300E 05
18000	1.0124	2.58079	25.0013	27.5811	5.12845	49.6817	54.8102	1.7069E 04	2.5606E 04	6.3348E 05
18500	1.0148	2.59373	25.0722	27.6633	5.15416	49.8226	54.9768	1.7092E 04	2.5610E 04	6.4397E 05
19000	1.0176	2.60777	25.1416	27.7493	5.18207	49.9604	55.1425	1.7115E 04	2.5614E 04	6.5447E 05
19500	1.0206	2.62291	25.2095	27.8324	5.21215	50.0954	55.3076	1.7138E 04	2.5618E 04	6.6498E 05

TABLE 21 (CONT.). IDEAL GAS FUNCTIONS FOR D 4+

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{RT}$	$-\frac{h^2}{RT}$	$\ln h$	$\ln h - \frac{h^2}{RT}$	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{h^2}{RT}$	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{h^2}{RT}$	TEMP. (°K)
20000	1.0240	2.63910	25.2761	27.9152	5.28433	50.2278	55.4721	6.51436	1.04496	20000
22000	1.0412	2.71364	25.5310	28.2446	5.39244	50.7343	56.1268	7.49166	1.16436	22000
24000	1.0646	2.80096	25.7708	28.5718	5.50598	51.2108	56.7808	8.58926	1.33506	24000
26000	1.0946	2.89660	25.9987	28.8953	5.59503	51.6638	57.4198	9.79906	1.49646	26000
28000	1.1314	2.99589	26.2170	29.2129	5.69333	52.0975	58.0509	1.11036	1.64966	28000
30000	1.1747	3.09465	26.4271	29.5217	5.79199	52.5150	58.6646	1.24876	1.84496	30000
32000	1.2244	3.18958	26.6299	29.8194	5.88822	52.9179	59.2562	1.39236	2.02826	32000
34000	1.2801	3.27832	26.8259	30.1043	5.98157	53.3076	59.8221	1.53936	2.21506	34000
36000	1.3415	3.35947	27.0157	30.3751	6.07502	53.6844	60.3684	1.68796	2.40336	36000
38000	1.4081	3.43235	27.1993	30.6316	6.16866	54.0495	60.8701	1.83676	2.59186	38000
40000	1.4794	3.49688	27.3770	30.8739	6.26258	54.4026	61.3515	1.98476	2.77946	40000
42000	1.5555	3.55334	27.5490	31.1024	6.35678	54.7445	61.8085	2.13106	2.96576	42000
44000	1.6355	3.60237	27.7155	31.3177	6.45128	55.0753	62.2335	2.27536	3.15076	44000
46000	1.7193	3.64432	27.8764	31.5209	6.54608	55.3953	62.6372	2.41726	3.33326	46000
48000	1.8065	3.68019	28.0324	31.7126	6.64128	55.7051	63.0302	2.55636	3.51036	48000
50000	1.8968	3.71037	28.1833	31.8939	6.73678	56.0049	63.3784	2.69326	3.68406	50000
60000	2.3875	3.80114	28.8691	32.6703	7.59349	57.3678	64.9213	3.33906	4.53216	60000
70000	2.9254	3.82868	29.4577	33.2664	8.60222	58.5374	66.1496	3.93476	5.32586	70000
80000	3.4934	3.82554	29.9690	33.7945	9.76019	59.5533	67.1593	4.49196	6.08166	80000
90000	4.0801	3.80922	30.4187	34.2719	10.95955	60.4470	68.0165	5.02416	6.81266	90000
100000	4.6790	3.79041	30.8191	34.6095	12.19217	61.2426	68.7747	5.54506	7.53226	100000
150000	7.8764	3.62921	32.3535	36.1827	17.60927	64.2918	71.9011	8.43326	11.6116	150000
200000	11.9444	4.09168	33.4891	37.5850	24.13919	66.5484	74.6876	11.23046	14.2706	200000
300000	24.7781	4.53381	35.2325	39.6645	38.81072	70.0127	78.8235	17.04716	21.4326	300000
400000	42.9708	4.35054	36.5022	40.8128	48.44524	72.5560	81.1812	22.46326	26.85816	400000
500000	63.6204	4.15519	37.4525	41.6077	58.25705	74.4243	82.6814	27.48956	31.88456	500000
600000	84.5643	3.96432	38.1928	42.1876	68.18564	75.8954	83.7741	32.51586	36.91086	600000
800000	123.4091	3.66729	39.2901	42.8576	77.23732	78.0789	85.3434	37.54216	41.93716	800000
1000000	156.4224	3.46202	40.0850	43.3470	86.19960	79.6575	86.5351	42.56846	46.96346	1000000
1500000	218.7576	3.16290	41.4249	44.5878	102.85520	82.3181	88.6083	47.59476	51.98976	1500000
2000000	256.1329	3.00422	42.3110	45.3152	116.96988	84.0790	90.0488	52.62106	56.99606	2000000
3000000	303.3408	2.84043	43.4938	46.3343	144.4440	86.4294	92.0738	57.64736	61.99136	3000000
4000000	330.3706	2.75682	44.2984	47.0552	164.2825	88.0282	93.5045	62.67266	66.99666	4000000
5000000	347.8131	2.70614	44.9077	47.6136	184.27756	89.2390	94.6166	67.70296	72.00696	5000000
6000000	359.9843	2.67216	45.3979	48.0701	204.43100	90.2131	95.5232	72.73326	77.00726	6000000
8000000	375.8382	2.62947	46.1602	48.7897	244.22518	91.7280	96.9931	82.75856	87.00256	8000000
10000000	385.7048	2.60373	46.7440	49.3477	274.17405	92.8880	98.0621	87.78386	91.99786	10000000

TABLE 22. IDEAL GAS FUNCTIONS FOR AR 4+ (ATOMIC WEIGHT 39.9484, $R = 1.90717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $N \leq 6$. SEE TABLE 44 FOR LIST OF STATES USED.

TEMP. (°F)	TEMP. (°C)	PARTIT. FUNCT.	$\frac{H^2-E}{RT}$	S^H	$(H^2-E)T - \frac{H^2-E}{CAL/MOLE}$	S^E	$E^E - E^H$	$H^2 - E^H$ -- CAL/MOLE	$(H^2-E^H)T - (H^2-E^H)$	TEMP. (°F)			
6.2394	2.88058	24.9902	27.9708	5.72420	49.6997	59.3899	1.86836	04	2.84218	04	2.48306	05	5000
6.3324	2.87337	25.1030	27.9764	5.70985	49.8039	59.5938	1.93586	04	2.94916	04	2.59406	05	5200
6.4271	2.86699	25.2114	28.0764	5.69719	50.0992	59.7963	2.00346	04	3.07696	04	2.70546	05	5400
6.5204	2.86137	25.3155	28.1769	5.68602	50.3061	59.9922	2.07146	04	3.18426	04	2.81716	05	5600
6.5995	2.85642	25.4156	28.2723	5.67617	50.5065	56.1817	2.13946	04	3.29226	04	2.92936	05	5800
6.6691	2.85205	25.5126	28.3647	5.66750	50.6973	56.3453	2.20826	04	3.40096	04	3.04196	05	6000
6.7441	2.84821	25.6061	28.4543	5.65986	50.8835	56.5423	2.27716	04	3.50916	04	3.15496	05	6200
6.8207	2.84482	25.6964	28.5413	5.65313	51.0631	56.7162	2.34626	04	3.61806	04	3.26806	05	6400
6.8982	2.84184	25.7839	28.6258	5.64720	51.2369	56.8841	2.41546	04	3.72726	04	3.38146	05	6600
6.9636	2.83921	25.8687	28.7079	5.64198	51.4054	57.0474	2.48516	04	3.83646	04	3.49546	05	6800
7.0322	2.83689	25.9510	28.7879	5.63737	51.5689	57.2043	2.55516	04	3.94646	04	3.60986	05	7000
7.0990	2.83466	26.0309	28.8657	5.63330	51.7277	57.3610	2.62526	04	4.05806	04	3.72546	05	7200
7.1663	2.83203	26.1085	28.9416	5.62969	51.8820	57.5117	2.69596	04	4.16606	04	3.83986	05	7400
7.2280	2.83142	26.1841	29.0155	5.62649	52.0321	57.6584	2.76596	04	4.27616	04	3.95446	05	7600
7.2904	2.83098	26.2576	29.0876	5.62365	52.1782	57.8018	2.83636	04	4.38646	04	4.06996	05	7800
7.3514	2.82870	26.3292	29.1579	5.62110	52.3205	57.9416	2.90726	04	4.49696	04	4.18546	05	8000
7.4112	2.82755	26.3991	29.2266	5.61882	52.4593	58.0781	2.97806	04	4.60746	04	4.30176	05	8200
7.4699	2.82652	26.4672	29.2937	5.61676	52.5947	58.2117	3.04896	04	4.71916	04	4.41806	05	8400
7.5274	2.82558	26.5337	29.3593	5.61489	52.7268	58.3417	3.11986	04	4.82806	04	4.53486	05	8600
7.5839	2.82471	26.5986	29.4233	5.61318	52.8559	58.4640	3.19006	04	4.93946	04	4.65136	05	8800
7.6393	2.82382	26.6621	29.4860	5.61160	52.9820	58.5936	3.26206	04	5.05046	04	4.76846	05	9000
7.6939	2.82319	26.7242	29.5473	5.61014	53.1053	58.7155	3.33316	04	5.16136	04	4.88576	05	9200
7.7475	2.82250	26.7849	29.6074	5.60877	53.2260	58.8347	3.40436	04	5.27226	04	4.99376	05	9400
7.8002	2.82184	26.8443	29.6661	5.60747	53.3440	58.9515	3.47516	04	5.38326	04	5.10106	05	9600
7.8521	2.82122	26.9025	29.7231	5.60624	53.4596	59.0659	3.54676	04	5.49416	04	5.21306	05	9800
7.9031	2.82063	26.9594	29.7801	5.60505	53.5729	59.1779	3.						

TABLE 22 (CONT.). IDEAL GAS FUNCTIONS FOR AR 4+

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{2\pi m k T}$	$\ln \frac{h^2}{2\pi m k T}$	$\ln \frac{h^2}{2\pi m k T} - \frac{5}{2}$	$\ln \frac{h^2}{2\pi m k T} - \frac{5}{2} - \ln \frac{h^2}{2\pi m k T}$	$\ln \frac{h^2}{2\pi m k T} - \frac{5}{2} - \ln \frac{h^2}{2\pi m k T}$	$\ln \frac{h^2}{2\pi m k T} - \frac{5}{2} - \ln \frac{h^2}{2\pi m k T}$	$\ln \frac{h^2}{2\pi m k T} - \frac{5}{2} - \ln \frac{h^2}{2\pi m k T}$	TEMP. (°K)		
2000	9.7789	2.78970	28.9053	31.0990	5.54359	57.4305	62.9832	7.1120E 04	1.1400E 05	1.1400E 06	20000
2200	10.0505	2.78524	29.1709	31.0954	5.53674	57.9675	63.5822	7.0847E 04	1.2176E 05	1.2753E 06	22000
2400	10.3018	2.78282	29.4132	32.1960	5.52993	58.4480	63.9748	8.5024E 04	1.3272E 05	1.4829E 06	24000
2600	10.5375	2.78284	29.6187	32.4187	5.52496	58.8914	64.4216	9.2113E 04	1.4370E 05	1.5312E 06	26000
2800	10.7616	2.78556	29.8422	32.6278	5.53537	59.3614	64.8368	9.9350E 04	1.5499E 05	1.6604E 06	28000
3000	10.9776	2.79116	30.0346	32.8237	5.54649	59.8037	65.2382	1.0637E 05	1.6639E 05	1.7895E 06	30000
3200	11.1887	2.79971	30.2150	33.0167	5.55849	60.2421	65.6056	1.1444E 05	1.7783E 05	1.9213E 06	32000
3400	11.3976	2.81128	30.3850	33.1965	5.56948	60.7002	65.9664	1.2230E 05	1.8994E 05	2.0529E 06	34000
3600	11.6069	2.82589	30.5461	33.3720	5.58050	61.1807	66.3157	1.3042E 05	2.0210E 05	2.1852E 06	36000
3800	11.8186	2.84354	30.6994	33.5429	5.59059	61.6847	66.6553	1.3921E 05	2.1472E 05	2.3187E 06	38000
4000	12.0349	2.86427	30.8457	33.7100	5.60178	62.2156	66.9874	1.4812E 05	2.2740E 05	2.4510E 06	40000
4200	12.2576	2.88808	30.9840	33.8741	5.61309	62.7744	67.3135	1.5750E 05	2.4104E 05	2.5841E 06	42000
4400	12.4805	2.91497	31.1210	34.0360	5.62522	63.3626	67.6351	1.6744E 05	2.5548E 05	2.7211E 06	44000
4600	12.7233	2.94486	31.2512	34.1962	5.63820	63.9014	67.9535	1.7790E 05	2.6920E 05	2.8567E 06	46000
4800	12.9516	2.97798	31.3773	34.3552	5.65175	64.4318	68.2695	1.8847E 05	2.8409E 05	2.9929E 06	48000
5000	13.2469	3.01405	31.4995	34.5136	5.66592	64.9548	68.5842	2.0011E 05	2.9947E 05	3.1297E 06	50000
6000	14.8223	3.23631	32.0677	35.3040	6.43109	63.7239	70.1550	2.6444E 05	3.8587E 05	3.8234E 06	60000
7000	16.9413	3.51031	32.5867	36.0970	6.97556	64.7552	71.7308	3.4919E 05	4.8829E 05	4.8829E 06	70000
8000	19.7594	3.80020	33.0744	36.8748	7.55163	65.7243	73.2760	4.4514E 05	6.0413E 05	5.2379E 06	80000
9000	23.3984	4.06969	33.5379	37.6076	8.08715	66.6454	74.7326	5.4900E 05	7.2704E 05	5.9981E 06	90000
10000	27.9424	4.29458	33.9788	38.2736	8.53405	67.5215	76.0555	6.5449E 05	8.5340E 05	6.7522E 06	100000
15000	64.7184	4.71032	35.8324	40.5427	9.36018	71.2049	80.5650	1.1040E 06	1.5040E 06	1.0881E 07	150000
20000	120.5037	4.56827	37.1732	41.7415	9.07790	73.4893	82.9472	1.4181E 06	1.8158E 06	1.4374E 07	200000
30000	255.7537	4.12508	38.9394	43.0645	8.19722	77.3791	85.5763	1.8430E 06	2.4592E 06	2.3214E 07	300000
40000	389.2408	3.79959	40.0786	43.8782	7.55042	79.6428	87.1932	2.2235E 06	3.0202E 06	3.1857E 07	400000
50000	507.0526	3.57526	40.9089	44.4761	7.10463	81.2788	88.3814	2.5587E 06	3.5523E 06	4.0430E 07	500000
60000	607.7148	3.41471	41.5378	44.9525	6.78560	82.5424	89.3280	2.8791E 06	4.0714E 06	4.9524E 07	600000
80000	765.9948	3.20262	42.4184	45.6910	6.34413	84.4315	90.7957	3.5014E 06	5.0913E 06	6.7544E 07	800000
100000	882.4050	3.06967	43.1878	46.2574	6.09993	85.8212	91.9212	4.1178E 06	5.9999E 06	8.5821E 07	1000000
15000001068.6634		2.88622	44.3929	47.2792	5.73539	88.2161	93.9515	5.6223E 06	8.6031E 06	1.3232E 08	1500000
20000001177.4513		2.79199	45.2091	48.0011	5.54814	89.8379	95.3861	7.1219E 06	1.1094E 07	1.7940E 08	2000000
30000001298.3037		2.69617	46.3205	49.0186	5.35773	92.0484	97.4041	1.0112E 07	1.5073E 07	2.7614E 08	3000000
40000001363.6903		2.64768	47.0888	49.7365	5.26138	93.5732	98.5346	1.3097E 07	2.1044E 07	3.7429E 08	4000000
50000001404.6153		2.61841	47.6762	50.2946	5.20321	94.7405	99.9438	1.6080E 07	2.6016E 07	4.7370E 08	5000000
60000001432.6309		2.59882	48.1518	50.7506	5.16428	95.6855	100.8498	1.9063E 07	3.0984E 07	5.7411E 08	6000000
80000001466.4973		2.57425	48.8957	51.4700	5.11546	97.1639	102.2793	2.5024E 07	4.0924E 07	7.7731E 08	8000000
100000001490.4790		2.55946	49.4684	52.0279	5.08608	98.3019	103.3880	3.0969E 07	5.0861E 07	9.8302E 08	10000000

TABLE 23. IDEAL GAS FUNCTIONS FOR C₅ (ATOMIC WEIGHT 12.0064, R = 1.9871 CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 67 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0 - E^0}{RT}$	$-\frac{F^0 - E^0}{RT}$	S/R	$\ln \frac{U^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\ln \frac{U^0 - E^0}{RT} - \frac{F^0 - E^0}{RT} - \frac{S}{R}$	$\ln \frac{U^0 - E^0}{RT} - \frac{F^0 - E^0}{RT} - \frac{S}{R} - \frac{1}{2} \ln \frac{M}{2\pi k T}$	$\ln \frac{U^0 - E^0}{RT} - \frac{F^0 - E^0}{RT} - \frac{S}{R} - \frac{1}{2} \ln \frac{M}{2\pi k T} - \frac{1}{2} \ln \frac{M}{2\pi k T}$	TEMP. (°K)
5000	2.00000	2.50000	22.0496	24.5496	4.96791	44.7841	1.49046	2.48406	5000
5200	2.00000	2.50000	22.1476	24.6476	4.96791	44.8110	1.55006	2.48316	5200
5400	2.00000	2.50000	22.2420	24.7420	4.96791	44.8365	1.60966	2.48276	5400
5600	2.00000	2.50000	22.3329	24.8329	4.96791	44.8611	1.66926	2.48206	5600
5800	2.00000	2.50000	22.4206	24.9206	4.96791	44.8848	1.72886	2.48146	5800
6000	2.00000	2.50000	22.5054	25.0054	4.96791	44.9079	1.78846	2.48076	6000
6200	2.00000	2.50000	22.5874	25.0874	4.96791	44.9307	1.84806	2.48016	6200
6400	2.00000	2.50000	22.6667	25.1667	4.96791	44.9532	1.90776	2.47956	6400
6600	2.00000	2.50000	22.7437	25.2437	4.96791	44.9754	1.96736	2.47896	6600
6800	2.00000	2.50000	22.8183	25.3183	4.96791	44.9973	2.02696	2.47836	6800
7000	2.00000	2.50000	22.8908	25.3908	4.96791	45.0189	2.08656	2.47776	7000
7200	2.00000	2.50000	22.9612	25.4612	4.96791	45.0402	2.14616	2.47716	7200
7400	2.00000	2.50000	23.0297	25.5297	4.96791	45.0613	2.20576	2.47656	7400
7600	2.00000	2.50000	23.0964	25.5964	4.96791	45.0822	2.26536	2.47596	7600
7800	2.00000	2.50000	23.1613	25.6613	4.96791	45.1029	2.32496	2.47536	7800
8000	2.00000	2.50000	23.2246	25.7246	4.96791	45.1234	2.38456	2.47476	8000
8200	2.00000	2.50000	23.2863	25.7863	4.96791	45.1437	2.44416	2.47416	8200
8400	2.00000	2.50000	23.3466	25.8466	4.96791	45.1638	2.50376	2.47356	8400
8600	2.00000	2.50000	23.4054	25.9054	4.96791	45.1837	2.56336	2.47296	8600
8800	2.00000	2.50000	23.4629	25.9629	4.96791	45.2034	2.62296	2.47236	8800
9000	2.00000	2.50000	23.5191	26.0191	4.96791	45.2229	2.68256	2.47176	9000
9200	2.00000	2.50000	23.5740	26.0740	4.96791	45.2422	2.74216	2.47116	9200
9400	2.00000	2.50000	23.6278	26.1278	4.96791	45.2613	2.80176	2.47056	9400
9600	2.00000	2.50000	23.6804	26.1804	4.96791	45.2802	2.86136	2.46996	9600
9800	2.00000	2.50000	23.7319	26.2319	4.96791	45.2989	2.92096	2.46936	9800
10000	2.00000	2.50000	23.7825	26.2825	4.96791	45.3174	2.98056	2.46876	10000
10500	2.00000	2.50000	23.9044	26.4044	4.96791	45.3521	3.12796	2.46776	10500
11000	2.00000	2.50000	24.0207	26.5207	4.96791	45.3852	3.27536	2.46676	11000
11500	2.00000	2.50000	24.1319	26.6319	4.96791	45.4175	3.42276	2.46576	11500
12000	2.00000	2.50000	24.2383	26.7383	4.96791	45.4490	3.57016	2.46476	12000
12500	2.00000	2.50000	24.3403	26.8403	4.96791	45.4798	3.71756	2.46376	12500
13000	2.00000	2.50000	24.4384	26.9384	4.96791	45.5099	3.86496	2.46276	13000
13500	2.00000	2.50000	24.5327	27.0327	4.96791	45.5393	4.01236	2.46176	13500
14000	2.00000	2.50000	24.6236	27.1236	4.96791	45.5681	4.15976	2.46076	14000
14500	2.00000	2.50000	24.7114	27.2114	4.96791	45.5963	4.30716	2.45976	14500
15000	2.00000	2.50000	24.7961	27.2961	4.96791	45.6240	4.45456	2.45876	15000
15500	2.00000	2.50000	24.8781	27.3781	4.96791	45.6513	4.60196	2.45776	15500
16000	2.00000	2.50000	24.9575	27.4575	4.96791	45.6782	4.74936	2.45676	16000
16500	2.00000	2.50000	25.0344	27.5344	4.96791	45.7047	4.89676	2.45576	16500
17000	2.00000	2.50000	25.1090	27.6090	4.96791	45.7308	5.04416	2.45476	17000
17500	2.00000	2.50000	25.1815	27.6815	4.96791	45.7565	5.19156	2.45376	17500
18000	2.00000	2.50000	25.2519	27.7519	4.96791	45.7818	5.33896	2.45276	18000
18500	2.00000	2.50000	25.3204	27.8204	4.96791	45.8068	5.48636	2.45176	18500
19000	2.00000	2.50000	25.3871	27.8871	4.96791	45.8314	5.63376	2.45076	19000
19500	2.00000	2.50000	25.4520	27.9520	4.96791	45.8556	5.78116	2.44976	19500

TABLE 23 (CONT.). IDEAL GAS FUNCTIONS FOR C 5+

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{5}{2}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT} - \frac{5}{2}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT} - \frac{5}{2}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT} - \frac{5}{2}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT} - \frac{5}{2}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT} - \frac{5}{2}$	TEMP. (°K)
20000	2.0000	2.50000	25.5153	28.0153	4.96791	50.7032	55.6711	5.96156	20000
22000	2.0000	2.50000	25.7536	28.2536	4.96791	51.1767	56.1446	6.55765	22000
24000	2.0000	2.50000	25.9711	28.4711	4.96791	51.6049	56.5768	7.15336	24000
26000	2.0000	2.50000	26.1712	28.6712	4.96791	52.0046	56.9745	7.74996	26000
28000	2.0000	2.50000	26.3565	28.8565	4.96791	52.3747	57.3426	8.34616	28000
30000	2.0000	2.50000	26.5290	29.0290	4.96791	52.7175	57.6954	8.94226	30000
32000	2.0000	2.50000	26.6903	29.1903	4.96791	53.0381	58.0060	9.53846	32000
34000	2.0000	2.50000	26.8419	29.3419	4.96791	53.3393	58.3072	1.01336	34000
36000	2.0000	2.50000	26.9848	29.4848	4.96791	53.6232	58.5911	1.07316	36000
38000	2.0000	2.50000	27.1200	29.6200	4.96791	53.8916	58.8597	1.13276	38000
40000	2.0000	2.50000	27.2482	29.7482	4.96791	54.1467	59.1146	1.19236	40000
42000	2.0000	2.50000	27.3702	29.8702	4.96791	54.3890	59.3570	1.25196	42000
44000	2.0000	2.50000	27.4865	29.9865	4.96791	54.6201	59.5881	1.31156	44000
46000	2.0000	2.50000	27.5976	30.0976	4.96791	54.8410	59.8089	1.37116	46000
48000	2.0000	2.50000	27.7040	30.2040	4.96791	55.0524	60.0203	1.43086	48000
50000	2.0000	2.50000	27.8060	30.3060	4.96791	55.2532	60.2231	1.49046	50000
60000	2.0000	2.50000	28.2619	30.7619	4.96791	56.1610	61.1289	1.78846	60000
70000	2.0000	2.50000	28.6472	31.1472	4.96791	56.9268	61.8967	2.08656	70000
80000	2.0000	2.50000	28.9811	31.4811	4.96791	57.5902	62.5581	2.38466	80000
90000	2.0000	2.50000	29.2755	31.7755	4.96791	58.1753	63.1437	2.68276	90000
100000	2.0000	2.50000	29.5389	32.0389	4.96791	58.6967	63.6666	2.98086	100000
150000	2.0000	2.50000	30.5526	33.0526	4.96791	60.7130	65.6809	4.07116	150000
200000	2.0000	2.50000	31.2718	33.7718	4.96791	62.1422	67.1101	5.06156	200000
300000	2.0000	2.50005	32.2856	34.7855	4.96801	64.1565	69.1245	6.05196	300000
400000	2.0001	2.50172	33.0048	35.5045	4.97132	65.5860	70.5573	6.94236	400000
500000	2.0031	2.51442	33.5640	36.0785	4.99656	66.6971	71.6939	7.50476	500000
600000	2.0149	2.55916	34.0258	36.5449	5.08547	67.6148	72.7003	7.85906	600000
800000	2.1120	2.82370	34.7920	37.6117	5.61116	69.1375	74.7487	8.89976	800000
1000000	2.3822	3.29156	35.4702	38.7618	6.54088	70.5852	77.0261	9.54976	1000000
1500000	4.0007	4.16599	37.0024	41.1684	8.2711	73.5298	81.8083	1.24106	1500000
2000000	6.6124	4.25275	38.2240	42.4768	8.65091	75.9575	84.4084	1.29276	2000000
3000000	12.8820	3.91038	39.8889	43.8073	7.78447	79.2669	87.0524	2.33506	3000000
4000000	18.2820	3.62155	40.9759	44.8016	7.20853	81.6219	88.4304	2.68346	4000000
5000000	22.9775	3.42599	41.7403	45.1863	6.80800	82.7847	89.7227	2.81046	5000000
6000000	26.8429	3.28297	42.3718	45.6546	6.52380	84.1994	90.7232	2.72206	6000000
8000000	32.4979	3.09636	43.2801	46.3845	6.15298	86.0207	92.1737	3.33276	8000000
10000000	36.8579	2.98092	43.9658	46.9467	5.92357	87.3672	93.2908	3.93646	10000000

TABLE 24. IDEAL GAS FUNCTIONS FOR N₂ (ATOMIC WEIGHT 14.0039, R = 1.98717 CAL/MOLE)

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 68 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E}{kT}$	$\frac{5\sigma}{kT}$	$\ln \left(\frac{h^2-E}{kT} - \frac{h^2-E_{VT}}{kT} \right) - \ln \left(\frac{h^2-E_{VT}}{kT} \right)$	$\frac{h^2-E}{kT} - \frac{h^2-E_{VT}}{kT}$	$\frac{h^2-E}{kT} - \frac{h^2-E_{VT}}{kT} - \frac{h^2-E_{VT}}{kT}$	$\frac{h^2-E}{kT} - \frac{h^2-E_{VT}}{kT} - \frac{h^2-E_{VT}}{kT}$	$\frac{h^2-E}{kT} - \frac{h^2-E_{VT}}{kT} - \frac{h^2-E_{VT}}{kT}$	$\frac{h^2-E}{kT} - \frac{h^2-E_{VT}}{kT} - \frac{h^2-E_{VT}}{kT}$	$\frac{h^2-E}{kT} - \frac{h^2-E_{VT}}{kT} - \frac{h^2-E_{VT}}{kT}$	TEMP. (°K)
5000	1.0000	2.50000	21.5876	24.0870	4.96791	47.0649	1.4904E 04	2.4840E 04	2.1640E 05	2.1640E 05	5000
5200	1.0000	2.50000	21.6851	24.1851	4.96791	48.0598	1.5000E 04	2.4883E 04	2.2400E 05	2.2400E 05	5200
5400	1.0000	2.50030	21.7794	24.2794	4.96791	48.2472	1.6492E 04	2.4872E 04	2.3171E 05	2.3171E 05	5400
5600	1.0000	2.50000	21.8704	24.3704	4.96791	48.4279	1.6492E 04	2.7820E 04	2.4290E 05	2.4290E 05	5600
5800	1.0000	2.50000	21.9581	24.4581	4.96791	48.6023	1.7288E 04	2.8814E 04	2.5300E 05	2.5300E 05	5800
6000	1.0000	2.50000	22.0428	24.5428	4.96791	48.7787	1.7884E 04	2.9801E 04	2.6282E 05	2.6282E 05	6000
6200	1.0000	2.50000	22.1248	24.6248	4.96791	48.9536	1.8481E 04	3.0801E 04	2.7250E 05	2.7250E 05	6200
6400	1.0000	2.50000	22.2042	24.7042	4.96791	49.1231	1.9071E 04	3.1788E 04	2.8170E 05	2.8170E 05	6400
6600	1.0000	2.50000	22.2811	24.7811	4.96791	49.2842	1.9672E 04	3.2780E 04	2.9122E 05	2.9122E 05	6600
6800	1.0000	2.50000	22.3557	24.8557	4.96791	49.4266	2.0278E 04	3.3782E 04	3.0059E 05	3.0059E 05	6800
7000	1.0000	2.50000	22.4282	24.9282	4.96791	49.5345	2.0846E 04	3.4777E 04	3.1100E 05	3.1100E 05	7000
7200	1.0000	2.50000	22.4986	24.9986	4.96791	49.6176	2.1461E 04	3.5767E 04	3.2190E 05	3.2190E 05	7200
7400	1.0000	2.50000	22.5671	25.0671	4.96791	49.6825	2.2050E 04	3.6754E 04	3.3184E 05	3.3184E 05	7400
7600	1.0000	2.50000	22.6338	25.1338	4.96791	49.9450	2.2654E 04	3.7754E 04	3.4180E 05	3.4180E 05	7600
7800	1.0000	2.50000	22.6987	25.1987	4.96791	50.0741	2.3258E 04	3.8754E 04	3.5183E 05	3.5183E 05	7800
8000	1.0000	2.50000	22.7620	25.2620	4.96791	50.1999	2.3844E 04	3.9745E 04	3.6184E 05	3.6184E 05	8000
8200	1.0000	2.50000	22.8238	25.3238	4.96791	50.3225	2.4432E 04	4.0737E 04	3.7194E 05	3.7194E 05	8200
8400	1.0000	2.50000	22.8840	25.3840	4.96791	50.4422	2.5004E 04	4.1730E 04	3.8190E 05	3.8190E 05	8400
8600	1.0000	2.50000	22.9428	25.4428	4.96791	50.5591	2.5434E 04	4.2724E 04	3.9200E 05	3.9200E 05	8600
8800	1.0000	2.50000	23.0003	25.5003	4.96791	50.6753	2.6221E 04	4.3718E 04	4.0221E 05	4.0221E 05	8800
9000	1.0000	2.50000	23.0565	25.5565	4.96791	50.7890	2.6827E 04	4.4711E 04	4.1235E 05	4.1235E 05	9000
9200	1.0000	2.50000	23.1114	25.6114	4.96791	50.8942	2.7423E 04	4.5705E 04	4.2252E 05	4.2252E 05	9200
9400	1.0000	2.50000	23.1652	25.6652	4.96791	50.9910	2.8019E 04	4.6696E 04	4.3271E 05	4.3271E 05	9400
9600	1.0000	2.50000	23.2178	25.7178	4.96791	51.1036	2.8613E 04	4.7692E 04	4.4292E 05	4.4292E 05	9600
9800	1.0000	2.50000	23.2694	25.7694	4.96791	51.2080	2.9211E 04	4.8686E 04	4.5315E 05	4.5315E 05	9800
10000	1.0000	2.50000	23.3199	25.8199	4.96791	51.3084	2.9807E 04	4.9678E 04	4.6340E 05	4.6340E 05	10000
10500	1.0000	2.50000	23.4119	25.9119	4.96791	51.5308	3.1390E 04	5.2163E 04	4.8912E 05	4.8912E 05	10500
11000	1.0000	2.50000	23.5042	26.0042	4.96791	51.7819	3.2788E 04	5.4447E 04	5.1494E 05	5.1494E 05	11000
11500	1.0000	2.50000	23.5963	26.0963	4.96791	52.0037	3.4279E 04	5.7131E 04	5.4990E 05	5.4990E 05	11500
12000	1.0000	2.50000	23.6875	26.1875	4.96791	52.2142	3.5769E 04	5.9613E 04	5.8490E 05	5.8490E 05	12000
12500	1.0000	2.50000	23.7778	26.2778	4.96791	47.2463	3.7259E 04	6.2099E 04	6.1931E 05	6.1931E 05	12500
13000	1.0000	2.50000	23.8678	26.3678	4.96791	47.4439	3.8750E 04	6.4567E 04	6.1937E 05	6.1937E 05	13000
13500	1.0000	2.50000	24.0702	26.5702	4.96791	47.8314	4.0240E 04	6.7067E 04	6.4572E 05	6.4572E 05	13500
14000	1.0000	2.50060	24.1611	26.6611	4.96791	48.0121	4.1730E 04	6.9551E 04	6.7217E 05	6.7217E 05	14000
14500	1.0000	2.50000	24.2488	26.7488	4.96791	48.1064	4.3221E 04	7.2032E 04	6.9670E 05	6.9670E 05	14500
15000	1.0000	2.50000	24.3336	26.8336	4.96791	48.3548	4.4711E 04	7.4517E 04	7.2332E 05	7.2332E 05	15000
15500	1.0000	2.50000	24.4155	26.9155	4.96791	48.5177	4.6202E 04	7.7003E 04	7.4520E 05	7.4520E 05	15500
16000	1.0000	2.50000	24.4949	26.9949	4.96791	48.6754	4.7692E 04	7.9485E 04	7.6701E 05	7.6701E 05	16000
16500	1.0000	2.50000	24.5718	27.0718	4.96791	48.8283	4.9182E 04	8.1971E 04	7.8884E 05	7.8884E 05	16500
17000	1.0000	2.50000	24.6465	27.1465	4.96791	48.9766	5.0673E 04	8.4457E 04	8.1066E 05	8.1066E 05	17000
17500	1.0000	2.50000	24.7189	27.2189	4.96791	49.1206	5.2163E 04	8.6930E 04	8.3184E 05	8.3184E 05	17500
18000	1.0000	2.50000	24.7894	27.2894	4.96791	49.2606	5.3653E 04	8.9422E 04	8.5304E 05	8.5304E 05	18000
18500	1.0000	2.50000	24.8579	27.3579	4.96791	49.3967	5.5144E 04	9.1906E 04	8.7422E 05	8.7422E 05	18500
19000	1.0000	2.50000	24.9245	27.4245	4.96791	49.5292	5.6634E 04	9.4390E 04	8.9540E 05	8.9540E 05	19000
19500	1.0000	2.50000	24.9895	27.4895	4.96791	49.6582	5.8123E 04	9.6874E 04	9.1664E 05	9.1664E 05	19500

TABLE 24 (CONT.). IDEAL GAS FUNCTIONS FOR $n = 3/2$ [illegible]

TABLE 25. IDEAL GAS FUNCTIONS FOR D⁺ IONIC WEIGHT 13.9966, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 69 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{W^2-E^2}{RT}$	$-\frac{E^2-E_0^2}{RT}$	$\frac{W^2-E^2}{RT}$	$-\frac{E^2-E_0^2}{RT}$	$\frac{W^2-E^2}{RT}$	$-\frac{E^2-E_0^2}{RT}$	$\frac{W^2-E^2}{RT}$	$-\frac{E^2-E_0^2}{RT}$	TEMP. (°K)
5000	2.0000	2.50000	22.4797	24.9797	4.96791	44.6710	49.6309	1.4904E 04	2.4440E 04	2.2135E 05
5200	2.0000	2.50000	22.5778	25.0778	4.96791	44.8658	49.6337	1.5500E 04	2.5037E 04	2.3330E 05
5400	2.0000	2.50000	22.6721	25.1721	4.96791	45.0533	50.0212	1.6094E 04	2.6427E 04	2.4329E 05
5600	2.0000	2.50000	22.7631	25.2631	4.96791	45.2403	50.2199	1.6692E 04	2.7820E 04	2.5311E 05
5800	2.0000	2.50000	22.8508	25.3508	4.96791	45.4263	50.3767	1.7286E 04	2.8814E 04	2.6237E 05
6000	2.0000	2.50000	22.9355	25.4355	4.96791	45.6115	50.5446	1.7884E 04	2.9807E 04	2.7144E 05
6200	2.0000	2.50000	23.0175	25.5175	4.96791	45.7966	50.7075	1.8481E 04	3.0801E 04	2.8039E 05
6400	2.0000	2.50000	23.0969	25.5969	4.96791	45.9813	50.8653	1.9077E 04	3.1794E 04	2.8934E 05
6600	2.0000	2.50000	23.1738	25.6738	4.96791	46.1658	51.0181	1.9673E 04	3.2786E 04	2.9829E 05
6800	2.0000	2.50000	23.2485	25.7485	4.96791	46.3503	51.1664	2.0269E 04	3.3778E 04	3.0724E 05
7000	2.0000	2.50000	23.3209	25.8209	4.96791	46.5346	51.3104	2.0865E 04	3.4770E 04	3.1619E 05
7200	2.0000	2.50000	23.3913	25.8913	4.96791	46.7186	51.4504	2.1461E 04	3.5762E 04	3.2514E 05
7400	2.0000	2.50000	23.4598	25.9598	4.96791	46.9025	51.5865	2.2057E 04	3.6754E 04	3.3409E 05
7600	2.0000	2.50000	23.5265	26.0265	4.96791	47.0861	51.7190	2.2652E 04	3.7746E 04	3.4304E 05
7800	2.0000	2.50000	23.5915	26.0915	4.96792	47.2694	51.8490	2.3250E 04	3.8738E 04	3.5199E 05
8000	2.0000	2.50000	23.6547	26.1547	4.96792	47.4525	51.9738	2.3848E 04	3.9730E 04	3.6094E 05
8200	2.0000	2.50000	23.7165	26.2165	4.96792	47.6354	52.0945	2.4446E 04	4.0722E 04	3.6989E 05
8400	2.0000	2.50000	23.7767	26.2767	4.96792	47.8181	52.2112	2.5044E 04	4.1714E 04	3.7884E 05
8600	2.0000	2.50000	23.8356	26.3356	4.96792	47.9999	52.3243	2.5642E 04	4.2706E 04	3.8779E 05
8800	2.0000	2.50001	23.8930	26.3930	4.96793	48.1815	52.4343	2.6240E 04	4.3698E 04	3.9674E 05
9000	2.0000	2.50001	23.9492	26.4492	4.96793	48.3629	52.5400	2.6838E 04	4.4690E 04	4.0569E 05
9200	2.0000	2.50001	24.0042	26.5042	4.96794	48.5441	52.6422	2.7436E 04	4.5682E 04	4.1464E 05
9400	2.0000	2.50002	24.0579	26.5579	4.96795	48.7251	52.7400	2.8034E 04	4.6674E 04	4.2359E 05
9600	2.0000	2.50002	24.1106	26.6106	4.96796	48.9059	52.8343	2.8632E 04	4.7666E 04	4.3254E 05
9800	2.0000	2.50003	24.1621	26.6621	4.96797	49.0866	52.9250	2.9230E 04	4.8658E 04	4.4149E 05
10000	2.0000	2.50004	24.2126	26.7126	4.96799	49.2671	53.0124	2.9828E 04	4.9650E 04	4.5044E 05
10500	2.0000	2.50007	24.3346	26.8347	4.96805	49.3568	53.3249	3.1026E 04	5.1248E 04	4.6448E 05
11000	2.0000	2.50012	24.4509	26.9510	4.96815	49.4500	53.5541	3.2224E 04	5.2852E 04	4.7852E 05
11500	2.0000	2.50020	24.5620	27.0622	4.96831	49.5468	53.7771	3.3422E 04	5.4456E 04	4.9256E 05
12000	2.0001	2.50032	24.6684	27.1688	4.96855	49.6460	53.9888	3.4620E 04	5.6060E 04	5.0660E 05
12500	2.0001	2.50049	24.7705	27.2710	4.96888	49.7481	54.1920	3.5818E 04	5.7664E 04	5.2064E 05
13000	2.0001	2.50072	24.8686	27.3693	4.96934	49.8530	54.3873	3.7016E 04	5.9268E 04	5.3468E 05
13500	2.0002	2.50103	24.9630	27.4640	4.96986	49.9605	54.5735	3.8214E 04	6.0872E 04	5.4872E 05
14000	2.0003	2.50144	25.0539	27.5556	4.97077	49.7843	54.7571	3.9412E 04	6.2476E 04	5.6276E 05
14500	2.0004	2.50195	25.1417	27.6437	4.97179	49.9508	54.9325	4.0610E 04	6.4080E 04	5.7680E 05
15000	2.0006	2.50260	25.2265	27.7291	4.97308	50.1293	55.1024	4.1808E 04	6.5684E 04	5.9084E 05
15500	2.0008	2.50339	25.3086	27.8120	4.97466	50.2924	55.2671	4.3006E 04	6.7288E 04	6.0488E 05
16000	2.0010	2.50435	25.3881	27.8925	4.97656	50.4504	55.4239	4.4204E 04	6.8892E 04	6.1892E 05
16500	2.0013	2.50549	25.4652	27.9707	4.97883	50.6036	55.5724	4.5402E 04	7.0496E 04	6.3296E 05
17000	2.0017	2.50683	25.5400	28.0468	4.98149	50.7522	55.7337	4.6600E 04	7.2100E 04	6.4700E 05
17500	2.0021	2.50834	25.6127	28.1211	4.98457	50.8967	55.8812	4.7800E 04	7.3704E 04	6.6104E 05
18000	2.0026	2.51016	25.6834	28.1935	4.98810	51.0371	56.0252	4.9000E 04	7.5308E 04	6.7508E 05
18500	2.0032	2.51218	25.7522	28.2644	4.99212	51.1739	56.1640	5.0200E 04	7.6912E 04	6.8912E 05
19000	2.0040	2.51445	25.8192	28.3337	4.99664	51.3071	56.3037	5.1400E 04	7.8516E 04	7.0316E 05
19500	2.0048	2.51698	25.8846	28.4015	5.00166	51.4369	56.4386	5.2600E 04	8.0120E 04	7.1720E 05

TABLE 25 (CONT.). IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIT. FUNC.	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{E^0}{RT}$	$\frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{E^0}{RT}$	$\frac{h^2}{RT}$	$\frac{h^2}{RT} - \frac{E^0}{RT}$	TEMP. (°K)
2000	2.0057	2.51978	25.9483	28.4681	5.00722	51.5708	6.0401E 04	1.0014E 05	1.0313E 06	20000
2200	2.0107	2.53377	26.1891	28.7229	5.03522	52.0421	6.7053E 04	1.1077E 05	1.1449E 06	22000
2400	2.0182	2.55225	26.4103	28.9626	5.07175	52.4817	7.4030E 04	1.2172E 05	1.2596E 06	24000
2600	2.0284	2.57491	26.6155	29.1905	5.11688	52.8894	8.1373E 04	1.3304E 05	1.3751E 06	26000
2800	2.0416	2.60137	26.8073	29.4086	5.16935	53.2705	8.9101E 04	1.4474E 05	1.4916E 06	28000
3000	2.0580	2.63073	26.9877	29.6185	5.22771	53.6291	9.7216E 04	1.5683E 05	1.6089E 06	30000
3200	2.0775	2.66225	27.1505	29.8208	5.29033	53.9684	1.0570E 05	1.6929E 05	1.7270E 06	32000
3400	2.1001	2.69511	27.3209	30.0160	5.3562	54.2911	1.1453E 05	1.8209E 05	1.8459E 06	34000
3600	2.1257	2.72854	27.4759	30.2044	5.42205	54.5991	1.2366E 05	1.9519E 05	1.9656E 06	36000
3800	2.1540	2.76187	27.6243	30.3862	5.48829	54.8940	1.3304E 05	2.0856E 05	2.0860E 06	38000
4000	2.1850	2.79454	27.7658	30.5613	5.55321	55.1772	1.4264E 05	2.2213E 05	2.2071E 06	40000
4200	2.2183	2.82659	27.9039	30.7300	5.61550	55.4497	1.5241E 05	2.3587E 05	2.3289E 06	42000
4400	2.2538	2.85816	28.0381	30.8922	5.67567	55.7123	1.6229E 05	2.4973E 05	2.4513E 06	44000
4600	2.2912	2.88932	28.1637	31.0482	5.73202	55.9659	1.7226E 05	2.6367E 05	2.5744E 06	46000
4800	2.3303	2.91999	28.2870	31.1980	5.78462	56.2110	1.8228E 05	2.7766E 05	2.6981E 06	48000
5000	2.3709	2.95048	28.4063	31.3418	5.83329	56.4481	1.9231E 05	2.9164E 05	2.8224E 06	50000
6000	2.5899	3.02834	28.9505	31.9788	6.01781	57.5294	2.4184E 05	3.4107E 05	3.4518E 06	60000
7000	2.8217	3.07905	29.4216	32.5006	6.11858	58.5655	2.8920E 05	4.2830E 05	4.0926E 06	70000
8000	3.0536	3.10064	29.8344	32.9350	6.16149	59.5658	3.3395E 05	4.9292E 05	4.7429E 06	80000
9000	3.2786	3.10434	30.1999	33.3043	6.16883	60.5122	3.7635E 05	5.5519E 05	5.4011E 06	90000
10000	3.4932	3.09817	30.5267	33.6249	6.15658	60.4617	4.1694E 05	6.1566E 05	6.0642E 06	100000
15000	4.4103	3.05737	31.7735	34.8309	6.07550	61.1392	6.1325E 05	9.1132E 05	9.4709E 06	150000
20000	5.2024	3.11220	32.6580	35.7702	6.18445	64.8969	8.3946E 05	1.2349E 06	1.2979E 07	200000
30000	7.0081	3.18258	33.6647	37.3473	6.22175	67.5034	1.4204E 06	2.0165E 06	2.8231E 07	300000
40000	9.2897	3.25680	34.9706	38.5774	7.06795	69.4923	2.0323E 06	2.8272E 06	2.7797E 07	400000
50000	11.8289	3.29313	35.7701	39.3632	7.14015	71.0810	2.5765E 06	3.5701E 06	3.5541E 07	500000
60000	14.4033	3.35875	36.4228	39.9815	7.07172	72.3701	3.0508E 06	4.2431E 06	4.3427E 07	600000
80000	19.2053	3.43120	37.4297	40.8609	6.81835	74.3790	4.5477E 06	5.4547E 06	5.9503E 07	800000
100000	23.3184	3.46681	38.1816	41.4884	6.57118	75.6732	6.5840E 06	6.5712E 06	7.5873E 07	1000000
150000	30.9052	3.08777	39.4770	42.5647	6.13592	78.4473	6.2231E 06	9.2039E 06	1.1767E 08	1500000
200000	35.8988	2.95762	40.3460	43.3036	5.87728	80.1741	7.7802E 06	1.1755E 07	1.6035E 08	2000000
300000	41.9238	2.81537	41.5148	44.3301	5.59460	82.4967	1.0822E 07	1.6784E 07	2.4749E 08	3000000
400000	45.3903	2.74012	42.3134	45.0535	5.44508	84.0838	1.3832E 07	2.1780E 07	3.3634E 08	4000000
500000	47.6333	2.69376	42.9195	45.6133	5.35295	85.2882	1.6829E 07	2.6745E 07	4.2644E 08	5000000
600000	49.2011	2.66237	43.4077	46.0701	5.29057	86.2583	1.9820E 07	3.1743E 07	5.1755E 08	6000000
800000	51.2445	2.62260	44.1676	46.7902	5.21155	87.7684	2.5795E 07	4.1692E 07	7.0215E 08	8000000
1000000	52.5212	2.59867	44.7501	47.3485	5.16359	88.9258	3.1764E 07	5.1636E 07	8.8726E 08	10000000

TABLE 26. IDEAL GAS FUNCTIONS FOR AR 3+ (ATOMIC WEIGHT 39.9480, $R = 1.98717$ CAL/MOLE) SEE TABLE 70 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\ln \frac{U}{RT}$	$\ln \frac{U}{RT} - \frac{F^0 - E^0}{RT}$	$\ln \frac{U}{RT} - \frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\ln \frac{U}{RT} - \frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\ln \frac{U}{RT} - \frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\ln \frac{U}{RT} - \frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\ln \frac{U}{RT} - \frac{F^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	TEMP. (°K)		
5000	3.9305	2.92300	24.5280	27.4510	5.80849	48.7413	54.5448	1.9107E 04	2.9042E 04	2.4371E 05	9000
5200	4.8949	2.90673	24.6424	27.5491	5.77616	48.9484	54.7446	1.9703E 04	3.0034E 04	2.5444E 05	9200
5400	4.0556	2.89167	24.7518	27.6434	5.74623	49.1859	54.9321	2.0299E 04	3.1030E 04	2.6560E 05	9400
5600	4.1127	2.87748	24.8567	27.7344	5.71843	49.3567	55.1128	2.0899E 04	3.2023E 04	2.7641E 05	9600
5800	4.1666	2.86466	24.9574	27.8221	5.69255	49.5545	55.2871	2.1491E 04	3.3017E 04	2.8768E 05	9800
6000	4.2176	2.85250	25.0543	27.9068	5.66840	49.7871	55.4555	2.2087E 04	3.4010E 04	2.9937E 05	10000
6200	4.2659	2.84113	25.1477	27.9888	5.64580	49.9726	55.6184	2.2680E 04	3.5004E 04	3.1157E 05	10200
6400	4.3115	2.83047	25.2377	28.0682	5.62462	50.1515	55.7761	2.3280E 04	3.5998E 04	3.2427E 05	10400
6600	4.3549	2.82046	25.3247	28.1451	5.60472	50.3247	55.9290	2.3874E 04	3.6991E 04	3.3744E 05	10600
6800	4.3961	2.81103	25.4087	28.2198	5.58599	50.4913	56.0773	2.4472E 04	3.7988E 04	3.5104E 05	10800
7000	4.4354	2.80215	25.4901	28.2922	5.56833	50.6530	56.2213	2.5084E 04	3.8978E 04	3.6497E 05	11000
7200	4.4728	2.79375	25.5689	28.3622	5.55165	50.8096	56.3613	2.5644E 04	3.9972E 04	3.7938E 05	11200
7400	4.5084	2.78581	25.6453	28.4311	5.53597	50.9615	56.4974	2.6240E 04	4.0963E 04	3.9427E 05	11400
7600	4.5425	2.77829	25.7195	28.4978	5.52093	51.1090	56.6299	2.6857E 04	4.1953E 04	4.0963E 05	11600
7800	4.5750	2.77116	25.7916	28.5628	5.50675	51.2522	56.7589	2.7453E 04	4.2953E 04	4.2553E 05	11800
8000	4.6061	2.76438	25.8617	28.6261	5.49328	51.3914	56.8847	2.8049E 04	4.3944E 04	4.4113E 05	12000
8200	4.6359	2.75793	25.9299	28.6878	5.48046	51.5269	57.0074	2.8644E 04	4.4940E 04	4.5725E 05	12200
8400	4.6645	2.75179	25.9962	28.7480	5.46826	51.6588	57.1271	2.9241E 04	4.5933E 04	4.7399E 05	12400
8600	4.6918	2.74593	26.0609	28.8069	5.45663	51.7874	57.2440	2.9837E 04	4.6927E 04	4.9137E 05	12600
8800	4.7181	2.74035	26.1240	28.8643	5.44552	51.9127	57.3582	3.0434E 04	4.7921E 04	5.0973E 05	12800
9000	4.7434	2.73501	26.1855	28.9205	5.43431	52.0349	57.4698	3.1030E 04	4.8914E 04	5.2863E 05	13000
9200	4.7677	2.72990	26.2456	28.9755	5.42476	52.1543	57.5790	3.1626E 04	4.9908E 04	5.4808E 05	13200
9400	4.7911	2.72501	26.3042	29.0292	5.41504	52.2708	57.6859	3.2222E 04	5.0901E 04	5.6801E 05	13400
9600	4.8136	2.72032	26.3615	29.0819	5.40573	52.3847	57.7905	3.2818E 04	5.1895E 04	5.8848E 05	13600
9800	4.8353	2.71583	26.4176	29.1334	5.39681	52.4961	57.8929	3.3414E 04	5.2888E 04	6.0948E 05	13800
10000	4.8562	2.71152	26.4724	29.1839	5.38824	52.6051	57.9933	3.4011E 04	5.3882E 04	6.3098E 05	14000
10500	4.9054	2.70146	26.6045	29.3059	5.36825	52.8075	58.2357	3.5018E 04	5.6367E 04	6.8428E 05	14500
11000	4.9505	2.69233	26.7299	29.4272	5.35011	53.1168	58.4669	3.6992E 04	5.8851E 04	7.4135E 05	15000
11500	4.9921	2.68401	26.8494	29.5334	5.33357	53.3542	58.6878	3.8488E 04	6.1336E 04	8.0289E 05	15500
12000	5.0305	2.67641	26.9635	29.6399	5.31846	53.5809	58.8993	3.9974E 04	6.3822E 04	8.6897E 05	16000
12500	5.0661	2.66944	27.0726	29.7420	5.30463	53.7977	59.1023	4.1466E 04	6.6308E 04	9.3947E 05	16500
13000	5.0993	2.66306	27.1772	29.8402	5.29194	54.0055	59.2974	4.2962E 04	6.8799E 04	1.0147E 06	17000
13500	5.1302	2.65720	27.2776	29.9348	5.28029	54.2050	59.4853	4.4457E 04	7.1284E 04	1.0953E 06	17500
14000	5.1591	2.65182	27.3741	30.0259	5.26961	54.3968	59.6665	4.5954E 04	7.3775E 04	1.1814E 06	18000
14500	5.1862	2.64690	27.4671	30.1140	5.25983	54.5816	59.8414	4.7454E 04	7.6268E 04	1.2743E 06	18500
15000	5.2117	2.64241	27.5567	30.1991	5.25090	54.7598	60.0104	4.8954E 04	7.8773E 04	1.3740E 06	19000
15500	5.2357	2.63831	27.6433	30.2816	5.24277	54.9318	60.1744	5.0462E 04	8.1283E 04	1.4814E 06	19500
16000	5.2583	2.63461	27.7270	30.3616	5.23541	55.0981	60.3335	5.1973E 04	8.3797E 04	1.5973E 06	20000
16500	5.2800	2.63126	27.8080	30.4393	5.22879	55.2591	60.4879	5.3481E 04	8.6325E 04	1.7222E 06	20500
17000	5.3005	2.62832	27.8865	30.5168	5.22291	55.4151	60.6380	5.5000E 04	8.8868E 04	1.8573E 06	21000
17500	5.3200	2.62572	27.9627	30.5948	5.21774	55.5665	60.7842	5.6538E 04	9.1428E 04	2.0028E 06	21500
18000	5.3388	2.62347	28.0366	30.6601	5.21328	55.7134	60.9267	5.8093E 04	9.4003E 04	2.1593E 06	22000
18500	5.3567	2.62158	28.1085	30.7300	5.20951	55.8562	61.0657	5.9664E 04	9.6593E 04	2.3273E 06	22500
19000	5.3740	2.62003	28.1784	30.7984	5.20644	56.0951	61.2015	6.1258E 04	9.9202E 04	2.5073E 06	23000
19500	5.3907	2.61883	28.2464	30.8652	5.20405	56.1303	61.3343	6.2729E 04	1.0184E 05	2.6999E 06	23500

TABLE 27. IDEAL GAS FUNCTIONS FOR C₆ (ATOMIC WEIGHT 12.0079, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4.

TEMP. (°K)	PARTIT. FUNC.	$\frac{h^2-E_0}{RT}$	$-\frac{F^0-E_0}{RT}$	S^0	$\ln \frac{h^2-E_0}{RT}$	$-\ln \frac{h^2-E_0}{RT}$	$-\ln \frac{h^2-E_0}{RT}$	$-\ln \frac{h^2-E_0}{RT}$	$-\ln \frac{h^2-E_0}{RT}$	$-\ln \frac{h^2-E_0}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	21.3564	23.8564	4.96791	42.4388	47.4885	1.4304E 04	2.4840E 04	2.1219E 05	9000
5200	1.0000	2.50000	21.4544	23.9544	4.96791	42.6335	47.6016	1.5500E 04	2.5833E 04	2.2169E 05	9200
5400	1.0000	2.50000	21.5488	24.0488	4.96791	42.8210	47.7889	1.6694E 04	2.6827E 04	2.3123E 05	9400
5600	1.0000	2.50000	21.6397	24.1397	4.96791	43.0016	47.9696	1.6692E 04	2.7820E 04	2.4081E 05	9600
5800	1.0000	2.50000	21.7274	24.2274	4.96791	43.1760	48.1439	1.7288E 04	2.8814E 04	2.5042E 05	9800
6000	1.0000	2.50000	21.8122	24.3122	4.96791	43.3444	48.3123	1.7888E 04	2.9807E 04	2.6007E 05	10000
6200	1.0000	2.50000	21.8941	24.3941	4.96791	43.5073	48.4752	1.8481E 04	3.0801E 04	2.6975E 05	10200
6400	1.0000	2.50000	21.9735	24.4735	4.96791	43.6650	48.6329	1.9077E 04	3.1795E 04	2.7944E 05	10400
6600	1.0000	2.50000	22.0504	24.5504	4.96791	43.8179	48.7858	1.9673E 04	3.2788E 04	2.8912E 05	10600
6800	1.0000	2.50000	22.1251	24.6251	4.96791	43.9662	48.9341	2.0269E 04	3.3782E 04	2.9879E 05	10800
7000	1.0000	2.50000	22.1975	24.6975	4.96791	44.1102	49.0781	2.0865E 04	3.4775E 04	3.0877E 05	11000
7200	1.0000	2.50000	22.2680	24.7680	4.96791	44.2502	49.2181	2.1461E 04	3.5768E 04	3.1840E 05	11200
7400	1.0000	2.50000	22.3365	24.8365	4.96791	44.3863	49.3542	2.2058E 04	3.6750E 04	3.2846E 05	11400
7600	1.0000	2.50000	22.4031	24.9031	4.96791	44.5188	49.4867	2.2654E 04	3.7734E 04	3.3834E 05	11600
7800	1.0000	2.50000	22.4681	24.9681	4.96791	44.6478	49.6157	2.3250E 04	3.8719E 04	3.4828E 05	11800
8000	1.0000	2.50000	22.5314	25.0314	4.96791	44.7736	49.7415	2.3846E 04	3.9704E 04	3.5819E 05	12000
8200	1.0000	2.50000	22.5931	25.0931	4.96791	44.8962	49.8642	2.4442E 04	4.0689E 04	3.6815E 05	12200
8400	1.0000	2.50000	22.6534	25.1534	4.96791	45.0160	49.9839	2.5038E 04	4.1673E 04	3.7813E 05	12400
8600	1.0000	2.50000	22.7122	25.2122	4.96791	45.1329	50.1008	2.5634E 04	4.2657E 04	3.8813E 05	12600
8800	1.0000	2.50000	22.7697	25.2697	4.96791	45.2471	50.2150	2.6231E 04	4.3641E 04	3.9817E 05	12800
9000	1.0000	2.50000	22.8256	25.3256	4.96791	45.3587	50.3264	2.6828E 04	4.4625E 04	4.0823E 05	13000
9200	1.0000	2.50000	22.8808	25.3808	4.96791	45.4679	50.4358	2.7425E 04	4.5609E 04	4.1830E 05	13200
9400	1.0000	2.50000	22.9345	25.4345	4.96791	45.5757	50.5427	2.8023E 04	4.6593E 04	4.2840E 05	13400
9600	1.0000	2.50000	22.9872	25.4872	4.96791	45.6813	50.6472	2.8621E 04	4.7577E 04	4.3852E 05	13600
9800	1.0000	2.50000	23.0387	25.5387	4.96791	45.7848	50.7497	2.9211E 04	4.8561E 04	4.4864E 05	13800
10000	1.0000	2.50000	23.0892	25.5892	4.96791	45.8862	50.8500	2.9807E 04	4.9549E 04	4.5882E 05	14000
10500	1.0000	2.50000	23.2112	25.7112	4.96791	46.1245	51.0924	3.1298E 04	5.2168E 04	4.8433E 05	14500
11000	1.0000	2.50000	23.3275	25.8275	4.96791	46.3576	51.3235	3.2788E 04	5.4647E 04	5.0971E 05	15000
11500	1.0000	2.50000	23.4386	25.9386	4.96791	46.5853	51.5444	3.4278E 04	5.7131E 04	5.3563E 05	15500
12000	1.0000	2.50000	23.5450	26.0450	4.96791	46.8079	51.7558	3.5769E 04	5.9615E 04	5.6145E 05	16000
12500	1.0000	2.50000	23.6471	26.1471	4.96791	46.9907	51.9586	3.7259E 04	6.2098E 04	5.8733E 05	16500
13000	1.0000	2.50000	23.7451	26.2451	4.96791	47.1855	52.1530	3.8749E 04	6.4583E 04	6.1341E 05	17000
13500	1.0000	2.50000	23.8395	26.3395	4.96791	47.3750	52.3409	4.0240E 04	6.7047E 04	6.3954E 05	17500
14000	1.0000	2.50000	23.9304	26.4304	4.96791	47.5537	52.5216	4.1730E 04	6.9551E 04	6.6578E 05	18000
14500	1.0000	2.50000	24.0181	26.5181	4.96791	47.7280	52.6959	4.3221E 04	7.2035E 04	6.9206E 05	18500
15000	1.0000	2.50000	24.1029	26.6029	4.96791	47.8984	52.8644	4.4711E 04	7.4519E 04	7.1845E 05	19000
15500	1.0000	2.50000	24.1849	26.6849	4.96791	48.0593	53.0273	4.6202E 04	7.7005E 04	7.4693E 05	19500
16000	1.0000	2.50000	24.2642	26.7642	4.96791	48.2171	53.1850	4.7692E 04	7.9487E 04	7.7147E 05	20000
16500	1.0000	2.50000	24.3412	26.8412	4.96791	48.3699	53.3379	4.9183E 04	8.1971E 04	7.9610E 05	20500
17000	1.0000	2.50000	24.4158	26.9158	4.96791	48.5182	53.4862	5.0677E 04	8.4455E 04	8.2481E 05	21000
17500	1.0000	2.50000	24.4883	26.9883	4.96791	48.6623	53.6302	5.2168E 04	8.6938E 04	8.5159E 05	21500
18000	1.0000	2.50000	24.5587	27.0587	4.96791	48.8022	53.7701	5.3653E 04	8.9422E 04	8.7844E 05	22000
18500	1.0000	2.50000	24.6272	27.1272	4.96791	48.9383	53.9062	5.5144E 04	9.1906E 04	9.0534E 05	18500
19000	1.0000	2.50000	24.6939	27.1939	4.96791	49.0708	54.0387	5.6634E 04	9.4390E 04	9.3235E 05	19000
19500	1.0000	2.50000	24.7588	27.2588	4.96791	49.1998	54.1678	5.8125E 04	9.6874E 04	9.5940E 05	19500

TABLE 27 (CONT.). IDEAL GAS FUNCTIONS FOR C 6

TEMP. (°K)	PARTIAL FUNCT.	$\frac{H^0 - H}{RT}$	$-\frac{H^0 - H}{RT}$	$\frac{H^0 - H}{RT}$	$\frac{H^0 - H}{RT}$	$\frac{H^0 - H}{RT}$	$\frac{H^0 - H}{RT}$	$\frac{H^0 - H}{RT}$	$\frac{H^0 - H}{RT}$	TEMP. (°K)
20000	1.0000	2.50000	26.8771	27.3221	4.96791	49.3256	56.2039	5.9619E 04	9.9359E 04	9.8651E 05
22000	1.0000	2.50000	23.0604	27.5604	4.96791	49.7991	57.6770	5.9579E 04	9.9359E 04	1.0994E 06
24000	1.0000	2.50000	25.2779	27.7779	4.96791	50.2316	58.1995	7.1538E 04	1.1923E 05	1.2054E 06
26000	1.0000	2.50000	25.4780	27.9780	4.96791	50.6290	58.5969	7.7498E 04	1.2917E 05	1.3164E 06
28000	1.0000	2.50000	25.6633	28.1633	4.96791	50.9972	58.9651	8.3461E 04	1.3910E 05	1.4279E 06
30000	1.0000	2.50000	25.8358	28.3358	4.96791	51.3399	59.3079	8.9422E 04	1.4904E 05	1.5402E 06
32000	1.0000	2.50000	25.9971	28.4971	4.96791	51.6604	59.5885	9.5384E 04	1.5897E 05	1.6531E 06
34000	1.0000	2.50000	26.1487	28.6487	4.96791	51.9717	59.8297	1.0135E 05	1.6891E 05	1.7667E 06
36000	1.0000	2.50000	26.2916	28.7916	4.96791	52.2657	60.0336	1.0731E 05	1.7884E 05	1.8808E 06
38000	1.0000	2.50000	26.4267	28.9267	4.96791	52.5433	60.2022	1.1327E 05	1.8876E 05	1.9955E 06
40000	1.0000	2.50000	26.5550	29.0550	4.96791	52.8061	60.3370	1.1923E 05	1.9872E 05	2.1104E 06
42000	1.0000	2.50000	26.6769	29.1769	4.96791	53.0715	60.4405	1.2519E 05	2.0869E 05	2.2265E 06
44000	1.0000	2.50000	26.7932	29.2932	4.96791	53.3286	60.5172	1.3115E 05	2.1859E 05	2.3427E 06
46000	1.0000	2.50000	26.9044	29.4044	4.96791	53.5769	60.5715	1.3711E 05	2.2852E 05	2.4593E 06
48000	1.0000	2.50000	27.0108	29.5108	4.96791	53.8169	60.6026	1.4308E 05	2.3844E 05	2.5764E 06
50000	1.0000	2.50000	27.1128	29.6128	4.96791	54.0497	60.7177	1.4904E 05	2.4840E 05	2.6940E 06
60000	1.0000	2.50000	27.5686	30.0686	4.96791	54.7834	60.7513	1.7884E 05	2.9807E 05	3.2870E 06
70000	1.0000	2.50000	27.9540	30.4540	4.96791	55.5492	60.8172	2.0865E 05	3.4775E 05	3.8804E 06
80000	1.0000	2.50000	28.2878	30.7878	4.96791	56.2125	61.1805	2.3846E 05	3.9741E 05	4.4708E 06
90000	1.0000	2.50000	28.5823	31.0823	4.96791	56.7918	61.7657	2.6827E 05	4.4711E 05	5.1118E 06
100000	1.0000	2.50000	28.8457	31.3457	4.96791	57.3212	62.2891	2.9807E 05	4.9679E 05	5.7321E 06
150000	1.0000	2.50000	29.8594	32.3594	4.96791	59.3355	64.3034	4.4711E 05	7.4519E 05	8.4003E 06
200000	1.0000	2.50000	30.5784	33.0784	4.96791	60.7447	65.7326	5.9619E 05	9.9359E 05	1.2153E 07
300000	1.0000	2.50000	31.5922	34.0922	4.96791	62.7790	67.7649	8.9422E 05	1.5904E 06	2.5683E 07
400000	1.0000	2.50000	32.3114	34.8114	4.96791	64.2082	69.1761	1.1923E 06	2.4840E 06	4.9679E 07
500000	1.0000	2.50000	32.8493	35.3493	4.96791	65.3167	70.2846	1.4904E 06	3.4775E 06	8.4003E 07
600000	1.0000	2.50000	33.2551	35.7551	4.96791	66.2225	71.1904	1.7884E 06	4.4711E 06	1.2153E 08
800000	1.0000	2.50000	34.0443	36.5443	4.96791	67.6517	72.6196	2.3846E 06	5.9619E 06	2.5683E 08
1000000	1.0000	2.50000	34.6022	37.1022	4.96791	68.7602	73.7281	2.9807E 06	7.4519E 06	4.9679E 08
1500000	1.0000	2.50000	35.6158	38.1158	4.96791	70.7745	75.7424	4.4711E 06	1.1923E 07	8.4003E 08
2000000	1.0000	2.50000	36.3350	38.8350	4.96791	72.2037	77.1716	5.9619E 06	1.5904E 07	1.2153E 09
3000000	1.0000	2.50000	37.3487	39.8487	4.96791	74.2180	79.1859	8.9422E 06	2.4840E 07	2.5683E 09
4000000	1.0000	2.50000	38.0679	40.5679	4.96791	75.6472	80.6151	1.1923E 07	3.4775E 07	4.9679E 09
5000000	1.0000	2.50000	38.6258	41.1258	4.96791	76.7558	81.7237	1.4904E 07	4.4711E 07	8.4003E 09
6000000	1.0000	2.50000	39.0816	41.5816	4.96791	77.6613	82.6294	1.7884E 07	5.9619E 07	1.2153E 10
8000000	1.0000	2.50000	39.8008	42.3008	4.96791	79.0907	84.0586	2.3846E 07	7.4519E 07	2.5683E 10
10000000	1.0000	2.50000	40.3486	42.8486	4.96791	80.1993	85.1672	2.9807E 07	9.9359E 07	4.9679E 10

TABLE 20. IDEAL GAS FUNCTIONS FOR N₂ (ATOMIC WEIGHT 14.0034, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 71 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0-E^0}{RT}$	$\frac{U^0-E^0}{T}$	$\frac{S^0}{R}$	$\ln \frac{U^0-E^0}{T}$	$\ln \frac{U^0-E^0}{T} - \frac{U^0-E^0}{T}$	$\frac{U^0-E^0}{T} - \frac{U^0-E^0}{T}$	$\frac{U^0-E^0}{T} - \frac{U^0-E^0}{T}$	$\frac{U^0-E^0}{T} - \frac{U^0-E^0}{T}$	TEMP. (°K)
5000	2.0000	2.50000	22.2801	24.7801	4.96791	49.2743	49.2442	1.4904E 04	2.4840E 04	5000
5200	2.0000	2.50000	22.3762	24.8791	4.96791	49.4371	49.2442	1.5500E 04	2.5833E 04	5200
5400	2.0000	2.50000	22.4725	24.9725	4.96791	49.6000	49.2442	1.6094E 04	2.6827E 04	5400
5600	2.0000	2.50000	22.5634	25.0634	4.96791	49.7625	49.2442	1.6692E 04	2.7820E 04	5600
5800	2.0000	2.50000	22.6512	25.1512	4.96791	49.9250	49.2442	1.7288E 04	2.8814E 04	5800
6000	2.0000	2.50000	22.7359	25.2359	4.96791	50.0875	50.1480	1.7884E 04	2.9807E 04	6000
6200	2.0000	2.50000	22.8179	25.3179	4.96791	50.2500	50.3109	1.8481E 04	3.0801E 04	6200
6400	2.0000	2.50000	22.8973	25.3973	4.96791	50.4125	50.4734	1.9077E 04	3.1795E 04	6400
6600	2.0000	2.50000	22.9742	25.4742	4.96791	50.5750	50.6359	1.9673E 04	3.2788E 04	6600
6800	2.0000	2.50000	23.0498	25.5498	4.96791	50.7375	50.7984	2.0269E 04	3.3782E 04	6800
7000	2.0000	2.50000	23.1213	25.6213	4.96791	50.9000	50.9609	2.0850E 04	3.4775E 04	7000
7200	2.0000	2.50000	23.1917	25.6917	4.96791	51.0625	51.1234	2.1431E 04	3.5768E 04	7200
7400	2.0000	2.50000	23.2602	25.7602	4.96791	51.2250	51.2859	2.2012E 04	3.6762E 04	7400
7600	2.0000	2.50000	23.3269	25.8269	4.96791	51.3875	51.4484	2.2593E 04	3.7756E 04	7600
7800	2.0000	2.50000	23.3918	25.8918	4.96791	51.5500	51.6109	2.3174E 04	3.8750E 04	7800
8000	2.0000	2.50000	23.4551	25.9551	4.96791	51.7125	51.7734	2.3755E 04	3.9744E 04	8000
8200	2.0000	2.50000	23.5169	26.0169	4.96791	51.8750	51.9359	2.4336E 04	4.0738E 04	8200
8400	2.0000	2.50000	23.5771	26.0771	4.96791	52.0375	52.0984	2.4917E 04	4.1732E 04	8400
8600	2.0000	2.50000	23.6359	26.1359	4.96791	52.2000	52.2609	2.5498E 04	4.2726E 04	8600
8800	2.0000	2.50000	23.6934	26.1934	4.96791	52.3625	52.4234	2.6079E 04	4.3720E 04	8800
9000	2.0000	2.50000	23.7496	26.2496	4.96791	52.5250	52.5859	2.6660E 04	4.4714E 04	9000
9200	2.0000	2.50000	23.8045	26.3045	4.96791	52.6875	52.7484	2.7241E 04	4.5708E 04	9200
9400	2.0000	2.50000	23.8583	26.3583	4.96791	52.8500	52.9109	2.7822E 04	4.6702E 04	9400
9600	2.0000	2.50000	23.9109	26.4109	4.96791	53.0125	53.0734	2.8403E 04	4.7696E 04	9600
9800	2.0000	2.50000	23.9625	26.4625	4.96791	53.1750	53.2359	2.8984E 04	4.8690E 04	9800
10000	2.0000	2.50000	24.0130	26.5130	4.96791	53.3375	53.3984	2.9565E 04	4.9684E 04	10000
10500	2.0000	2.50000	24.1350	26.6350	4.96791	53.5000	53.5609	3.0146E 04	5.0678E 04	10500
11000	2.0000	2.50000	24.2512	26.7512	4.96791	53.6625	53.7234	3.0727E 04	5.1672E 04	11000
11500	2.0000	2.50000	24.3624	26.8624	4.96791	53.8250	53.8859	3.1308E 04	5.2666E 04	11500
12000	2.0000	2.50000	24.4688	26.9688	4.96791	53.9875	54.0484	3.1889E 04	5.3660E 04	12000
12500	2.0000	2.50000	24.5709	27.0709	4.96791	54.1500	54.2109	3.2470E 04	5.4654E 04	12500
13000	2.0000	2.50000	24.6689	27.1689	4.96791	54.3125	54.3734	3.3051E 04	5.5648E 04	13000
13500	2.0000	2.50000	24.7633	27.2633	4.96791	54.4750	54.5359	3.3632E 04	5.6642E 04	13500
14000	2.0000	2.50000	24.8542	27.3542	4.96791	54.6375	54.6984	3.4213E 04	5.7636E 04	14000
14500	2.0000	2.50000	24.9419	27.4419	4.96791	54.8000	54.8609	3.4794E 04	5.8630E 04	14500
15000	2.0000	2.50000	25.0267	27.5267	4.96791	54.9625	55.0234	3.5375E 04	5.9624E 04	15000
15500	2.0000	2.50000	25.1086	27.6086	4.96791	55.1250	55.1859	3.5956E 04	6.0618E 04	15500
16000	2.0000	2.50000	25.1880	27.6880	4.96791	55.2875	55.3484	3.6537E 04	6.1612E 04	16000
16500	2.0000	2.50000	25.2649	27.7649	4.96791	55.4500	55.5109	3.7118E 04	6.2606E 04	16500
17000	2.0000	2.50000	25.3396	27.8396	4.96791	55.6125	55.6734	3.7699E 04	6.3600E 04	17000
17500	2.0000	2.50000	25.4120	27.9120	4.96791	55.7750	55.8359	3.8280E 04	6.4594E 04	17500
18000	2.0000	2.50000	25.4825	27.9825	4.96791	55.9375	56.0000	3.8861E 04	6.5588E 04	18000
18500	2.0000	2.50000	25.5510	28.0510	4.96791	56.1000	56.1609	3.9442E 04	6.6582E 04	18500
19000	2.0000	2.50000	25.6176	28.1176	4.96791	56.2625	56.3234	4.0023E 04	6.7576E 04	19000
19500	2.0000	2.50000	25.6826	28.1826	4.96791	56.4250	56.4859	4.0604E 04	6.8570E 04	19500

TABLE 28 (CONT.). IDEAL GAS FUNCTIONS FOR N_2 +[illegible]

TABLE 29. IDEAL GAS FUNCTIONS FOR O⁺ (ATOMIC WEIGHT 15.9946, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 72 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - E_0}{RT}$	$-\frac{E - E_0}{RT}$	S/R	$(h^2 - E_0)/RT$	$-\frac{E - E_0}{RT}$	S/R	$\frac{h^2 - E_0}{RT}$	$-\frac{E - E_0}{RT}$	S/R	$\frac{h^2 - E_0}{RT}$	$-\frac{E - E_0}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	21.7865	24.2845	4.96791	43.2925	48.2614	1.4944E 04	2.4840E 04	2.1647E 05	5000	5000	
5200	1.0000	2.50000	21.8846	24.3846	4.96791	43.4983	48.5362	1.5500E 04	2.5833E 04	2.2614E 05	5200	5200	
5400	1.0000	2.50000	21.9789	24.4789	4.96791	43.6758	48.8237	1.6096E 04	2.6827E 04	2.3580E 05	5400	5400	
5600	1.0000	2.50000	22.0699	24.5699	4.96791	43.8385	49.1164	1.6728E 04	2.7820E 04	2.4546E 05	5600	5600	
5800	1.0000	2.50000	22.1576	24.6576	4.96791	44.0308	49.4167	1.7398E 04	2.8816E 04	2.5513E 05	5800	5800	
6000	1.0000	2.50000	22.2423	24.7423	4.96791	44.1922	49.7167	1.7994E 04	2.9807E 04	2.6520E 05	6000	6000	
6200	1.0000	2.50000	22.3243	24.8243	4.96791	44.3621	50.0180	1.8601E 04	3.0801E 04	2.7508E 05	6200	6200	
6400	1.0000	2.50000	22.4037	24.9037	4.96791	44.5188	50.3209	1.9217E 04	3.1795E 04	2.8493E 05	6400	6400	
6600	1.0000	2.50000	22.4806	24.9806	4.96791	44.6727	50.6254	1.9846E 04	3.2788E 04	2.9484E 05	6600	6600	
6800	1.0000	2.50000	22.5553	25.0553	4.96791	44.8210	50.9315	2.0486E 04	3.3782E 04	3.0479E 05	6800	6800	
7000	1.0000	2.50000	22.6277	25.1277	4.96791	44.9646	51.2389	2.1136E 04	3.4775E 04	3.1476E 05	7000	7000	
7200	1.0000	2.50000	22.6982	25.1982	4.96791	45.1050	51.5479	2.1796E 04	3.5768E 04	3.2476E 05	7200	7200	
7400	1.0000	2.50000	22.7667	25.2667	4.96791	45.2411	51.8584	2.2466E 04	3.6761E 04	3.3476E 05	7400	7400	
7600	1.0000	2.50000	22.8333	25.3333	4.96791	45.3734	52.1699	2.3136E 04	3.7754E 04	3.4476E 05	7600	7600	
7800	1.0000	2.50000	22.8983	25.3983	4.96791	45.5026	52.4824	2.3806E 04	3.8747E 04	3.5476E 05	7800	7800	
8000	1.0000	2.50000	22.9616	25.4616	4.96791	45.6284	52.7959	2.4476E 04	3.9740E 04	3.6476E 05	8000	8000	
8200	1.0000	2.50000	23.0233	25.5233	4.96791	45.7511	53.1094	2.5146E 04	4.0733E 04	3.7476E 05	8200	8200	
8400	1.0000	2.50000	23.0835	25.5835	4.96791	45.8708	53.4229	2.5816E 04	4.1726E 04	3.8476E 05	8400	8400	
8600	1.0000	2.50000	23.1424	25.6424	4.96791	45.9877	53.7364	2.6486E 04	4.2719E 04	3.9476E 05	8600	8600	
8800	1.0000	2.50000	23.1998	25.6998	4.96791	46.1019	54.0509	2.7156E 04	4.3712E 04	4.0476E 05	8800	8800	
9000	1.0000	2.50000	23.2560	25.7560	4.96791	46.2135	54.3654	2.7826E 04	4.4705E 04	4.1476E 05	9000	9000	
9200	1.0000	2.50000	23.3110	25.8110	4.96791	46.3227	54.6809	2.8496E 04	4.5698E 04	4.2476E 05	9200	9200	
9400	1.0000	2.50000	23.3647	25.8647	4.96791	46.4296	54.9954	2.9166E 04	4.6691E 04	4.3476E 05	9400	9400	
9600	1.0000	2.50000	23.4174	25.9174	4.96791	46.5342	55.3109	2.9836E 04	4.7684E 04	4.4476E 05	9600	9600	
9800	1.0000	2.50000	23.4689	25.9689	4.96791	46.6366	55.6254	3.0506E 04	4.8677E 04	4.5476E 05	9800	9800	
10000	1.0000	2.50000	23.5194	26.0194	4.96791	46.7370	55.9409	3.1176E 04	4.9670E 04	4.6476E 05	10000	10000	
10500	1.0000	2.50000	23.6416	26.1416	4.96791	46.9793	56.5554	3.2426E 04	5.1120E 04	4.8476E 05	10500	10500	
11000	1.0000	2.50000	23.7577	26.2577	4.96791	47.2195	57.1709	3.3676E 04	5.2564E 04	5.0476E 05	11000	11000	
11500	1.0000	2.50000	23.8688	26.3688	4.96791	47.4513	57.7854	3.4926E 04	5.3998E 04	5.2476E 05	11500	11500	
12000	1.0000	2.50000	23.9752	26.4752	4.96791	47.6827	58.3999	3.6176E 04	5.5432E 04	5.4476E 05	12000	12000	
12500	1.0000	2.50000	24.0773	26.5773	4.96791	47.8435	59.0144	3.7426E 04	5.6866E 04	5.6476E 05	12500	12500	
13000	1.0000	2.50000	24.1753	26.6753	4.96791	48.0494	59.6289	3.8676E 04	5.8300E 04	5.8476E 05	13000	13000	
13500	1.0000	2.50000	24.2697	26.7697	4.96791	48.2279	60.2434	3.9926E 04	5.9734E 04	6.0476E 05	13500	13500	
14000	1.0000	2.50000	24.3606	26.8606	4.96791	48.4085	60.8579	4.1176E 04	6.1168E 04	6.2476E 05	14000	14000	
14500	1.0000	2.50000	24.4483	26.9483	4.96791	48.5829	61.4724	4.2426E 04	6.2602E 04	6.4476E 05	14500	14500	
15000	1.0000	2.50000	24.5331	27.0331	4.96791	48.7513	62.0869	4.3676E 04	6.3996E 04	6.6476E 05	15000	15000	
15500	1.0000	2.50000	24.6151	27.1151	4.96791	48.9142	62.7014	4.4926E 04	6.5390E 04	6.8476E 05	15500	15500	
16000	1.0000	2.50000	24.6944	27.1944	4.96791	49.0719	63.3159	4.6176E 04	6.6784E 04	7.0476E 05	16000	16000	
16500	1.0000	2.50000	24.7714	27.2714	4.96791	49.2248	63.9304	4.7426E 04	6.8178E 04	7.2476E 05	16500	16500	
17000	1.0000	2.50000	24.8460	27.3460	4.96791	49.3731	64.5449	4.8676E 04	6.9572E 04	7.4476E 05	17000	17000	
17500	1.0000	2.50000	24.9185	27.4185	4.96791	49.5171	65.1594	4.9926E 04	7.0966E 04	7.6476E 05	17500	17500	
18000	1.0000	2.50000	24.9889	27.4889	4.96791	49.6570	65.7739	5.1176E 04	7.2360E 04	7.8476E 05	18000	18000	
18500	1.0000	2.50000	25.0574	27.5574	4.96791	49.7932	66.3884	5.2426E 04	7.3754E 04	8.0476E 05	18500	18500	
19000	1.0000	2.50000	25.1240	27.6240	4.96791	49.9256	66.9999	5.3676E 04	7.5148E 04	8.2476E 05	19000	19000	
19500	1.0000	2.50000	25.1890	27.6890	4.96791	50.0547	67.6144	5.4926E 04	7.6542E 04	8.4476E 05	19500	19500	

TABLE 29 (CONT.). IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0-E^0}{RT}$	$\frac{S^0-E^0}{RT}$	$\ln \frac{U^0-E^0}{RT} - \frac{S^0-E^0}{RT}$	$\frac{S^0-E^0}{RT} - \frac{S^0-E^0}{RT}$	$\frac{S^0-E^0}{RT} - \frac{S^0-E^0}{RT}$	$\frac{S^0-E^0}{RT} - \frac{S^0-E^0}{RT}$	$\frac{S^0-E^0}{RT} - \frac{S^0-E^0}{RT}$	TEMP. (°K)
20000	1.0000	2.50000	25.2523	4.96791	50.1805	55.1486	5.9612E 04	9.3358E 04	1.0034E 06
22000	1.0000	2.50000	25.4706	4.96791	50.5340	55.5119	5.9576E 04	9.3358E 04	1.1144E 06
24000	1.0000	2.50000	25.7081	4.96791	50.8862	55.8741	5.9534E 04	9.3358E 04	1.2281E 06
26000	1.0000	2.50000	25.9682	4.96791	51.2483	56.2362	5.9487E 04	9.3358E 04	1.3446E 06
28000	1.0000	2.50000	26.2405	4.96791	51.6205	56.6084	5.9436E 04	9.3358E 04	1.4639E 06
30000	1.0000	2.50000	26.5242	4.96791	52.0027	56.9806	5.9380E 04	9.3358E 04	1.5860E 06
32000	1.0000	2.50000	26.8183	4.96791	52.3949	57.3528	5.9319E 04	9.3358E 04	1.7109E 06
34000	1.0000	2.50000	27.1229	4.96791	52.7971	57.7249	5.9253E 04	9.3358E 04	1.8386E 06
36000	1.0000	2.50000	27.4380	4.96791	53.2093	58.0971	5.9182E 04	9.3358E 04	1.9690E 06
38000	1.0000	2.50000	27.7635	4.96791	53.6315	58.4693	5.9106E 04	9.3358E 04	2.1021E 06
40000	1.0000	2.50000	28.0994	4.96791	54.0637	58.8415	5.9025E 04	9.3358E 04	2.2379E 06
42000	1.0000	2.50000	28.4457	4.96791	54.5059	59.2137	5.8939E 04	9.3358E 04	2.3764E 06
44000	1.0000	2.50000	28.8024	4.96791	54.9581	59.5859	5.8848E 04	9.3358E 04	2.5176E 06
46000	1.0000	2.50000	29.1695	4.96791	55.4203	59.9581	5.8752E 04	9.3358E 04	2.6615E 06
48000	1.0000	2.50000	29.5470	4.96791	55.8925	60.3303	5.8651E 04	9.3358E 04	2.8081E 06
50000	1.0000	2.50000	29.9349	4.96791	56.3747	60.7025	5.8545E 04	9.3358E 04	2.9574E 06
52000	1.0000	2.50000	30.3332	4.96791	56.8669	61.0747	5.8434E 04	9.3358E 04	3.1095E 06
54000	1.0000	2.50000	30.7419	4.96791	57.3691	61.4469	5.8318E 04	9.3358E 04	3.2644E 06
56000	1.0000	2.50000	31.1610	4.96791	57.8813	61.8191	5.8197E 04	9.3358E 04	3.4221E 06
58000	1.0000	2.50000	31.5905	4.96791	58.4035	62.1913	5.8071E 04	9.3358E 04	3.5826E 06
60000	1.0000	2.50000	32.0304	4.96791	58.9357	62.5635	5.7940E 04	9.3358E 04	3.7459E 06
62000	1.0000	2.50000	32.4807	4.96791	59.4779	62.9357	5.7804E 04	9.3358E 04	3.9120E 06
64000	1.0000	2.50000	32.9414	4.96791	60.0301	63.3079	5.7663E 04	9.3358E 04	4.0809E 06
66000	1.0000	2.50000	33.4125	4.96791	60.5923	63.6801	5.7517E 04	9.3358E 04	4.2526E 06
68000	1.0000	2.50000	33.8940	4.96791	61.1645	64.0523	5.7366E 04	9.3358E 04	4.4271E 06
70000	1.0000	2.50000	34.3859	4.96791	61.7467	64.4245	5.7210E 04	9.3358E 04	4.6044E 06
72000	1.0000	2.50000	34.8882	4.96791	62.3389	64.7967	5.7049E 04	9.3358E 04	4.7845E 06
74000	1.0000	2.50000	35.3909	4.96791	62.9411	65.1689	5.6883E 04	9.3358E 04	4.9674E 06
76000	1.0000	2.50000	35.9040	4.96791	63.5533	65.5411	5.6712E 04	9.3358E 04	5.1531E 06
78000	1.0000	2.50000	36.4275	4.96791	64.1755	65.9133	5.6536E 04	9.3358E 04	5.3415E 06
80000	1.0000	2.50000	36.9614	4.96791	64.8077	66.2855	5.6355E 04	9.3358E 04	5.5326E 06
82000	1.0000	2.50000	37.5057	4.96791	65.4500	66.6577	5.6169E 04	9.3358E 04	5.7264E 06
84000	1.0000	2.50000	38.0604	4.96791	66.1022	67.0299	5.5978E 04	9.3358E 04	5.9229E 06
86000	1.0000	2.50000	38.6255	4.96791	66.7644	67.4021	5.5782E 04	9.3358E 04	6.1221E 06
88000	1.0000	2.50000	39.2010	4.96791	67.4366	67.7743	5.5581E 04	9.3358E 04	6.3240E 06
90000	1.0000	2.50000	39.7869	4.96791	68.1188	68.1465	5.5375E 04	9.3358E 04	6.5286E 06
92000	1.0000	2.50000	40.3832	4.96791	68.8109	68.5187	5.5164E 04	9.3358E 04	6.7359E 06
94000	1.0000	2.50000	40.9900	4.96791	69.5129	68.8909	5.4948E 04	9.3358E 04	6.9459E 06
96000	1.0000	2.50000	41.6072	4.96791	70.2249	69.2631	5.4727E 04	9.3358E 04	7.1586E 06
98000	1.0000	2.50000	42.2349	4.96791	70.9469	69.6353	5.4501E 04	9.3358E 04	7.3739E 06
100000	1.0000	2.50000	42.8732	4.96791	71.6789	70.0075	5.4270E 04	9.3358E 04	7.5919E 06
102000	1.0000	2.50000	43.5219	4.96791	72.4209	70.3797	5.4034E 04	9.3358E 04	7.8126E 06
104000	1.0000	2.50000	44.1810	4.96791	73.1729	70.7519	5.3793E 04	9.3358E 04	8.0359E 06
106000	1.0000	2.50000	44.8505	4.96791	73.9349	71.1241	5.3547E 04	9.3358E 04	8.2619E 06
108000	1.0000	2.50000	45.5304	4.96791	74.7069	71.4963	5.3296E 04	9.3358E 04	8.4896E 06
110000	1.0000	2.50000	46.2207	4.96791	75.4889	71.8685	5.3040E 04	9.3358E 04	8.7190E 06
112000	1.0000	2.50000	46.9214	4.96791	76.2809	72.2407	5.2779E 04	9.3358E 04	8.9501E 06
114000	1.0000	2.50000	47.6325	4.96791	77.0829	72.6129	5.2513E 04	9.3358E 04	9.1828E 06
116000	1.0000	2.50000	48.3540	4.96791	77.8949	72.9851	5.2242E 04	9.3358E 04	9.4171E 06
118000	1.0000	2.50000	49.0859	4.96791	78.7169	73.3573	5.1966E 04	9.3358E 04	9.6530E 06
120000	1.0000	2.50000	49.8282	4.96791	79.5489	73.7295	5.1685E 04	9.3358E 04	9.8905E 06
122000	1.0000	2.50000	50.5809	4.96791	80.3909	74.1017	5.1399E 04	9.3358E 04	1.0140E 07
124000	1.0000	2.50000	51.3440	4.96791	81.1429	74.4739	5.1108E 04	9.3358E 04	1.0382E 07
126000	1.0000	2.50000	52.1175	4.96791	81.9049	74.8461	5.0812E 04	9.3358E 04	1.0631E 07
128000	1.0000	2.50000	52.9014	4.96791	82.6769	75.2183	5.0511E 04	9.3358E 04	1.0887E 07
130000	1.0000	2.50000	53.6957	4.96791	83.4589	75.5905	5.0205E 04	9.3358E 04	1.1150E 07
132000	1.0000	2.50000	54.5004	4.96791	84.2509	75.9627	5.0000E 04	9.3358E 04	1.1420E 07
134000	1.0000	2.50000	55.3155	4.96791	85.0529	76.3349	4.9795E 04	9.3358E 04	1.1697E 07
136000	1.0000	2.50000	56.1410	4.96791	85.8649	76.7071	4.9589E 04	9.3358E 04	1.1981E 07
138000	1.0000	2.50000	56.9769	4.96791	86.6869	77.0793	4.9383E 04	9.3358E 04	1.2272E 07
140000	1.0000	2.50000	57.8232	4.96791	87.5189	77.4515	4.9177E 04	9.3358E 04	1.2570E 07
142000	1.0000	2.50000	58.6800	4.96791	88.3609	77.8237	4.8971E 04	9.3358E 04	1.2875E 07
144000	1.0000	2.50000	59.5472	4.96791	89.2129	78.1959	4.8765E 04	9.3358E 04	1.3187E 07
146000	1.0000	2.50000	60.4249	4.96791	90.0749	78.5681	4.8559E 04	9.3358E 04	1.3506E 07
148000	1.0000	2.50000	61.3132	4.96791	90.9469	78.9403	4.8353E 04	9.3358E 04	1.3832E 07
150000	1.0000	2.50000	62.2121	4.96791	91.8289	79.3125	4.8147E 04	9.3358E 04	1.4165E 07
152000	1.0000	2.50000	63.1216	4.96791	92.7209	79.6847	4.7941E 04	9.3358E 04	1.4506E 07
154000	1.0000	2.50000	64.0419	4.96791	93.6329	80.0569	4.7735E 04	9.3358E 04	1.4854E 07
156000	1.0000	2.50000	64.9732	4.96791	94.5549	80.4291	4.7529E 04	9.3358E 04	1.5209E 07
158000	1.0000	2.50000	65.9155	4.96791	95.4869	80.8013	4.7323E 04	9.3358E 04	1.5571E 07
160000	1.0000	2.50000	66.8688	4.96791	96.4289	81.1735	4.7117E 04	9.3358E 04	1.5940E 07
162000	1.0000	2.50000	67.8331	4.96791	97.3809	81.5457	4.6911E 04	9.3358E 04	1.6316E 07
164000	1.0000	2.50000	68.8084	4.96791	98.3429	81.9179	4.6705E 04	9.3358E 04	1.6699E 07
166000	1.0000	2.50000	69.7947	4.96791	99.3149	82.2901	4.6499E 04	9.3358E 04	1.7089E 07
168000	1.0000	2.50000	70.7920	4.96791	100.2969	82.6623	4.6293E 04	9.3358E 04	1.7486E 07
170000	1.0000	2.50000	71.8003	4.96791	101.2889	83.0345	4.6087E 04	9.3358E 04	1.7889E 07
172000	1.0000	2.50000	72.8196	4.96791	102.2909	83.4067	4.5881E 04	9.3358E 04	1.8298E 07
174000	1.0000	2.50000	73.8499	4.96791	103.3029	83.7789	4.5675E 04	9.3358E 04	1.8713E 07
176000	1.0000	2.50000	74.8912	4.96791	104.3249	84.1511	4.5469E 04	9.3358E 04	1.9134E 07
178000	1.0000	2.50000	75.9435	4.96791	105.3569	84.5233	4.5263E 04	9.3358E 04	1.9561E 07
180000	1.0000	2.50000	77.0068	4.96791	106.3989	84.8955	4.5057E 04	9.3358E 04	1.9994E 07
182000	1.0000	2.50000	78.0811	4.96791	107.4509	85.2677	4.4851E 04	9.3358E 04	2.0433E 07
184000	1.0000	2.50000	79.1664	4.96791	108.5129	85.6400	4.4645E 04	9.3358E 04	2.0878E 07
186000	1.0000	2.50000	80.2627	4.96791	109.5849	86.0122	4.4439E 04	9.3358E 04	2.1329E 07
188000	1.0000	2.50000	81.3700	4.96791	110.6669	86.3844	4.4233E 04	9.3358E 04	2.1786E 07
190000	1.0000	2.50000	82.4883	4.96791	111.7589	86.7566	4.4027E 04	9.3358E 04	2.2249E 07
192000	1.0000	2.50000	83.6176	4.96791	112.8609	87.1288	4.3821E 04	9.3358E 04	2.2718E 07
194000	1.0000	2.50000	84.7579	4.96791	113.9729	87.5010	4.3615E 04	9.3358E 04	2.3193E 07
196000	1.0000	2.50000	85.9092	4.96791	115.0949	87.8732	4.3409E 04	9.3358E 04	2.3674E 07
198000	1.0000	2.50000	87.0715	4.96791	116.2269	88.2454	4.3203E 04	9.3358E 04	2.4161E 07
200000	1.0000	2.50000	88.2448	4.96791	117.3689	88.6176	4.3000E 04	9.3358E 04	2.4654E 07
202000	1.0000	2.50000	89.4291	4.96791	118.5209				

TABLE 10. IDEAL GAS FUNCTIONS FOR AN ϵ_0 (ATOMIC WEIGHT 39.948, $R = 1.98717$ CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 73 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	23.1593	29.6193	4.96791	50.9992	1.4904E 04	2.4840E 04	2.3011E 05	5000
5200	1.0000	2.50000	23.2573	29.7573	4.96791	51.1841	1.5500E 04	2.6833E 04	2.4493E 05	5200
5400	1.0000	2.50000	23.3517	29.8517	4.96791	51.3716	1.6096E 04	2.8827E 04	2.5050E 05	5400
5600	1.0000	2.50000	23.4426	29.9426	4.96791	51.5522	1.6692E 04	3.0820E 04	2.5607E 05	5600
5800	1.0000	2.50000	23.5303	30.0303	4.96791	51.7356	1.7288E 04	3.2814E 04	2.6172E 05	5800
6000	1.0000	2.50000	23.6151	30.1151	4.96791	51.9221	1.7884E 04	3.4807E 04	2.6750E 05	6000
6200	1.0000	2.50000	23.6971	30.1971	4.96791	52.1119	1.8481E 04	3.6801E 04	2.7341E 05	6200
6400	1.0000	2.50000	23.7764	30.2764	4.96791	52.3049	1.9077E 04	3.8795E 04	2.7944E 05	6400
6600	1.0000	2.50000	23.8534	30.3534	4.96791	52.5006	1.9673E 04	4.0789E 04	2.8558E 05	6600
6800	1.0000	2.50000	23.9280	30.4280	4.96791	52.6989	2.0269E 04	4.2783E 04	2.9184E 05	6800
7000	1.0000	2.50000	24.0005	30.5005	4.96791	52.8998	2.0865E 04	4.4777E 04	2.9822E 05	7000
7200	1.0000	2.50000	24.0709	30.5709	4.96791	53.1032	2.1461E 04	4.6771E 04	3.0472E 05	7200
7400	1.0000	2.50000	24.1394	30.6394	4.96791	53.3093	2.2058E 04	4.8765E 04	3.1134E 05	7400
7600	1.0000	2.50000	24.2061	30.7061	4.96791	53.5181	2.2654E 04	5.0759E 04	3.1808E 05	7600
7800	1.0000	2.50000	24.2710	30.7710	4.96791	53.7297	2.3250E 04	5.2753E 04	3.2494E 05	7800
8000	1.0000	2.50000	24.3343	30.8343	4.96791	53.9442	2.3846E 04	5.4747E 04	3.3192E 05	8000
8200	1.0000	2.50000	24.3960	30.8960	4.96791	54.1614	2.4442E 04	5.6741E 04	3.3902E 05	8200
8400	1.0000	2.50000	24.4563	30.9563	4.96791	54.3814	2.5038E 04	5.8735E 04	3.4623E 05	8400
8600	1.0000	2.50000	24.5151	31.0151	4.96791	54.6039	2.5634E 04	6.0729E 04	3.5356E 05	8600
8800	1.0000	2.50000	24.5726	31.0726	4.96792	54.8290	2.6231E 04	6.2724E 04	3.6102E 05	8800
9000	1.0000	2.50000	24.6287	31.1287	4.96792	55.0567	2.6827E 04	6.4718E 04	3.6861E 05	9000
9200	1.0000	2.50000	24.6837	31.1837	4.96792	55.2870	2.7423E 04	6.6714E 04	3.7632E 05	9200
9400	1.0000	2.50000	24.7375	31.2375	4.96792	55.5199	2.8019E 04	6.8710E 04	3.8415E 05	9400
9600	1.0000	2.50000	24.7901	31.2901	4.96792	55.7554	2.8615E 04	7.0706E 04	3.9210E 05	9600
9800	1.0000	2.50001	24.8415	31.3415	4.96793	55.9935	2.9211E 04	7.2702E 04	4.0017E 05	9800
10000	1.0000	2.50001	24.8922	31.3922	4.96793	56.2342	2.9808E 04	7.4708E 04	4.0836E 05	10000
10500	1.0000	2.50002	25.0141	31.5141	4.96796	56.7349	3.1298E 04	7.9714E 04	4.3217E 05	10500
11000	1.0000	2.50004	25.1304	31.6304	4.96799	57.2356	3.2789E 04	8.4720E 04	4.5600E 05	11000
11500	1.0000	2.50008	25.2416	31.7416	4.96806	57.7363	3.4280E 04	8.9723E 04	4.8000E 05	11500
12000	1.0000	2.50013	25.3480	31.8481	4.96817	58.2370	3.5772E 04	9.4726E 04	5.0415E 05	12000
12500	1.0000	2.50022	25.4500	31.9502	4.96835	58.7374	3.7265E 04	9.9729E 04	5.2841E 05	12500
13000	1.0000	2.50035	25.5481	32.0484	4.96861	59.2378	3.8758E 04	10.4732E 04	5.5276E 05	13000
13500	1.0000	2.50054	25.6425	32.1428	4.96896	59.7382	4.0251E 04	10.9735E 04	5.7721E 05	13500
14000	1.0001	2.50080	25.7334	32.2337	4.96951	60.2386	4.1744E 04	11.4738E 04	6.0176E 05	14000
14500	1.0001	2.50117	25.8212	32.3223	4.97023	60.7390	4.3237E 04	11.9741E 04	6.2641E 05	14500
15000	1.0001	2.50165	25.9060	32.4076	4.97119	61.2394	4.4730E 04	12.4744E 04	6.5116E 05	15000
15500	1.0002	2.50228	25.9880	32.4903	4.97233	61.7398	4.6223E 04	12.9747E 04	6.7601E 05	15500
16000	1.0003	2.50308	26.0675	32.5705	4.97363	62.2399	4.7716E 04	13.4750E 04	7.0096E 05	16000
16500	1.0004	2.50408	26.1445	32.6486	4.97509	62.7399	4.9209E 04	13.9753E 04	7.2601E 05	16500
17000	1.0005	2.50532	26.2193	32.7246	4.97674	63.2399	5.0702E 04	14.4756E 04	7.5116E 05	17000
17500	1.0007	2.50682	26.2919	32.7987	4.97856	63.7399	5.2195E 04	14.9759E 04	7.7641E 05	17500
18000	1.0009	2.50862	26.3626	32.8712	4.98054	64.2399	5.3688E 04	15.4762E 04	8.0176E 05	18000
18500	1.0012	2.51075	26.4313	32.9421	4.98269	64.7399	5.5181E 04	15.9765E 04	8.2721E 05	18500
19000	1.0015	2.51325	26.4983	33.0116	4.98501	65.2399	5.6674E 04	16.4768E 04	8.5276E 05	19000
19500	1.0019	2.51613	26.5636	33.0798	4.98749	65.7399	5.8167E 04	16.9771E 04	8.7831E 05	19500

TABLE 30 (CONT.). IDEAL GAS FUNCTIONS FOR AR 6+

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{RT}$	$-\frac{h^2}{RT}$	$\ln \frac{h^2}{RT}$	$-\ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT}$	$-\ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT}$	$-\ln \frac{h^2}{RT}$	TEMP. (°K)
20000	1.0024	2.51945	26.6274	5.00554	52.9130	57.9195	6.0380E 04	1.0013E 05	1.0583E 06	20000
22000	1.0050	2.53749	26.8643	5.04242	53.3917	58.4341	6.7216E 04	1.1093E 05	1.1746E 06	22000
24000	1.0094	2.56427	27.0902	5.09462	53.8326	58.9282	7.4403E 04	1.2229E 05	1.2920E 06	24000
26000	1.0160	2.60062	27.2968	5.16787	54.2432	59.4111	8.2698E 04	1.3434E 05	1.4103E 06	26000
28000	1.0252	2.64671	27.4911	5.25945	54.6294	59.8889	9.1624E 04	1.4726E 05	1.5294E 06	28000
30000	1.0376	2.70204	27.6794	5.36940	54.9959	60.3653	1.0147E 05	1.6108E 05	1.6479E 06	30000
32000	1.0533	2.76862	27.8519	5.49374	55.3464	60.8422	1.1227E 05	1.7584E 05	1.7711E 06	32000
34000	1.0726	2.83614	28.0217	5.63568	55.6837	61.3196	1.2468E 05	1.9162E 05	1.8932E 06	34000
36000	1.0958	2.91216	28.1859	5.78695	56.0101	61.7971	1.3879E 05	2.0833E 05	2.0164E 06	36000
38000	1.1228	2.99226	28.3455	5.94611	56.3272	62.2733	1.5044E 05	2.2595E 05	2.1404E 06	38000
40000	1.1540	3.07513	28.5011	6.11079	56.6364	62.7472	1.6495E 05	2.4443E 05	2.2655E 06	40000
42000	1.1892	3.15968	28.6532	6.27881	56.9386	63.2174	1.8025E 05	2.6371E 05	2.3914E 06	42000
44000	1.2287	3.24502	28.8021	6.44938	57.2346	63.6830	1.9629E 05	2.8373E 05	2.5183E 06	44000
46000	1.2725	3.33045	28.9483	6.61816	57.5250	64.1431	2.1303E 05	3.0444E 05	2.6461E 06	46000
48000	1.3206	3.41549	29.0918	6.78715	57.8102	64.5974	2.3040E 05	3.2578E 05	2.7749E 06	48000
50000	1.3733	3.49976	29.2329	6.95641	58.0907	65.0453	2.4837E 05	3.4773E 05	2.9045E 06	50000
60000	1.7084	3.90172	29.9071	7.75336	59.4304	67.1838	3.4597E 05	4.6520E 05	3.5458E 06	60000
70000	2.1792	4.25493	30.5359	8.45525	60.6798	69.1351	4.5237E 05	5.9187E 05	4.2474E 06	70000
80000	2.6084	4.57900	31.1234	9.01755	61.8473	70.8649	5.6243E 05	7.2140E 05	4.9678E 06	80000
90000	3.6151	4.73960	31.6703	9.41836	62.9342	72.3525	6.8881E 05	8.4765E 05	5.6441E 06	90000
100000	4.6097	4.86475	32.1768	9.66705	63.9406	73.6076	7.6799E 05	9.6671E 05	6.3941E 06	100000
150000	12.2684	4.84697	34.1693	9.63172	67.9001	77.5318	1.1467E 06	1.4448E 06	1.0185E 07	150000
200000	23.1530	4.56943	35.5236	9.04047	70.5913	79.6317	1.4107E 06	1.8008E 06	1.4110E 07	200000
300000	46.1000	4.05924	37.2484	8.12777	80.6359	82.1249	1.8230E 06	2.4199E 06	2.2218E 07	300000
400000	71.9194	3.74465	38.3899	7.66124	76.2871	83.7283	2.1816E 06	2.9765E 06	3.0515E 07	400000
500000	92.6782	3.53318	39.2013	7.02100	77.8995	84.9206	2.5169E 06	3.5105E 06	3.8920E 07	500000
600000	110.3281	3.38235	39.5315	6.72129	79.1517	85.8720	2.8405E 06	4.0328E 06	4.7491E 07	600000
800000	136.0279	3.18232	40.7747	6.32379	81.0260	87.3498	3.4893E 06	5.0590E 06	6.4821E 07	800000
1000000	158.4085	3.05594	41.6703	6.07267	82.4083	88.4809	4.0855E 06	5.0727E 06	8.2500E 07	1000000
1500000	191.0945	2.87977	42.6715	5.72259	84.7953	90.5179	5.6031E 06	8.5833E 06	1.2719E 08	1500000
2000000	210.2490	2.78831	43.4862	5.54084	86.8143	91.9552	7.1073E 06	1.1082E 07	1.7283E 08	2000000
3000000	231.5931	2.69455	44.5966	5.35452	88.6208	93.9753	1.0102E 07	1.6064E 07	2.6586E 08	3000000
4000000	243.1718	2.64680	45.3466	5.29943	90.1469	95.4066	1.3090E 07	2.1039E 07	3.6059E 08	4000000
5000000	250.4106	2.61787	45.9519	5.20214	91.3139	96.5161	1.6075E 07	2.6011E 07	4.5657E 08	5000000
6000000	255.4049	2.59846	46.4273	5.16357	92.2588	97.4223	1.9058E 07	3.0981E 07	5.5355E 08	6000000
8000000	261.7795	2.57407	47.1712	5.11510	93.7369	98.8520	2.5023E 07	4.0921E 07	7.6990E 08	8000000
10000000	265.6839	2.55936	47.7439	5.08588	94.8750	99.9408	3.0987E 07	5.0859E 07	9.4475E 08	10000000

TABLE 31. IDEAL GAS FUNCTIONS FOR N₂ (ATOMIC WEIGHT 14.0078, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS M.S.A.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT} - \frac{E_0-E_1}{RT}$	S/R	$\ln \frac{h^2-E_0}{RT} - \frac{h^2-E_1}{RT}$	$\frac{h^2-E_0}{RT} - \frac{h^2-E_1}{RT}$	$\frac{h^2-E_0}{RT} - \frac{h^2-E_1}{RT}$	$\frac{h^2-E_0}{RT} - \frac{h^2-E_1}{RT}$	TEMP. (°K)
5000	1.0000	2.50000	21.5849	24.0849	4.96791	42.8968	47.8647	1.4904E 04	5000
5200	1.0000	2.50000	21.6850	24.1850	4.96791	43.0916	48.0595	1.5500E 04	5200
5400	1.0000	2.50000	21.7793	24.2793	4.96791	43.2791	48.2470	1.6095E 04	5400
5600	1.0000	2.50000	21.8702	24.3702	4.96791	43.4598	48.4277	1.6692E 04	5600
5800	1.0000	2.50000	21.9580	24.4580	4.96791	43.6341	48.6020	1.7288E 04	5800
6000	1.0000	2.50000	22.0427	24.5427	4.96791	43.8025	48.7704	1.7884E 04	6000
6200	1.0000	2.50000	22.1247	24.6247	4.96791	43.9654	48.9333	1.8481E 04	6200
6400	1.0000	2.50000	22.2041	24.7041	4.96791	44.1231	49.0911	1.9077E 04	6400
6600	1.0000	2.50000	22.2810	24.7810	4.96791	44.2760	49.2439	1.9673E 04	6600
6800	1.0000	2.50000	22.3556	24.8556	4.96791	44.4243	49.3922	2.0269E 04	6800
7000	1.0000	2.50000	22.4281	24.9281	4.96791	44.5683	49.5362	2.0865E 04	7000
7200	1.0000	2.50000	22.4985	24.9985	4.96791	44.7083	49.6762	2.1461E 04	7200
7400	1.0000	2.50000	22.5670	25.0670	4.96791	44.8444	49.8123	2.2058E 04	7400
7600	1.0000	2.50000	22.6337	25.1337	4.96791	44.9769	49.9448	2.2654E 04	7600
7800	1.0000	2.50000	22.6986	25.1986	4.96791	45.1059	50.0738	2.3250E 04	7800
8000	1.0000	2.50000	22.7619	25.2619	4.96791	45.2317	50.1996	2.3846E 04	8000
8200	1.0000	2.50000	22.8237	25.3237	4.96791	45.3544	50.3223	2.4443E 04	8200
8400	1.0000	2.50000	22.8839	25.3839	4.96791	45.4741	50.4450	2.5039E 04	8400
8600	1.0000	2.50000	22.9427	25.4427	4.96791	45.5910	50.5589	2.5634E 04	8600
8800	1.0000	2.50000	23.0002	25.5002	4.96791	45.7052	50.6731	2.6231E 04	8800
9000	1.0000	2.50000	23.0564	25.5564	4.96791	45.8168	50.7848	2.6827E 04	9000
9200	1.0000	2.50000	23.1113	25.6113	4.96791	45.9260	50.8939	2.7423E 04	9200
9400	1.0000	2.50000	23.1651	25.6651	4.96791	46.0329	51.0008	2.8019E 04	9400
9600	1.0000	2.50000	23.2177	25.7177	4.96791	46.1375	51.1054	2.8615E 04	9600
9800	1.0000	2.50000	23.2693	25.7693	4.96791	46.2399	51.2078	2.9211E 04	9800
10000	1.0000	2.50000	23.3198	25.8198	4.96791	46.3403	51.3082	2.9807E 04	10000
10500	1.0000	2.50000	23.4418	25.9418	4.96791	46.5826	51.5506	3.1298E 04	10500
11000	1.0000	2.50000	23.5581	26.0581	4.96791	46.8138	51.7817	3.2788E 04	11000
11500	1.0000	2.50000	23.6692	26.1692	4.96791	47.0346	52.0025	3.4279E 04	11500
12000	1.0000	2.50000	23.7756	26.2756	4.96791	47.2460	52.2139	3.5769E 04	12000
12500	1.0000	2.50000	23.8776	26.3776	4.96791	47.4488	52.4167	3.7259E 04	12500
13000	1.0000	2.50000	23.9757	26.4757	4.96791	47.6437	52.6116	3.8750E 04	13000
13500	1.0000	2.50000	24.0700	26.5700	4.96791	47.8312	52.7991	4.0240E 04	13500
14000	1.0000	2.50000	24.1610	26.6610	4.96791	48.0118	52.9787	4.1730E 04	14000
14500	1.0000	2.50000	24.2487	26.7487	4.96791	48.1862	53.1541	4.3221E 04	14500
15000	1.0000	2.50000	24.3334	26.8334	4.96791	48.3546	53.3225	4.4711E 04	15000
15500	1.0000	2.50000	24.4154	26.9154	4.96791	48.5175	53.4854	4.6202E 04	15500
16000	1.0000	2.50000	24.4948	26.9948	4.96791	48.6752	53.6431	4.7692E 04	16000
16500	1.0000	2.50000	24.5717	27.0717	4.96791	48.8281	53.7950	4.9182E 04	16500
17000	1.0000	2.50000	24.6464	27.1464	4.96791	48.9764	53.9443	5.0673E 04	17000
17500	1.0000	2.50000	24.7188	27.2188	4.96791	49.1204	54.0883	5.2163E 04	17500
18000	1.0000	2.50000	24.7892	27.2892	4.96791	49.2603	54.2282	5.3653E 04	18000
18500	1.0000	2.50000	24.8577	27.3577	4.96791	49.3965	54.3644	5.5144E 04	18500
19000	1.0000	2.50000	24.9244	27.4244	4.96791	49.5289	54.4969	5.6634E 04	19000
19500	1.0000	2.50000	24.9894	27.4894	4.96791	49.6590	54.6259	5.8125E 04	19500

TABLE 21 (CONT'D). IDEAL GAS FUNCTIONS FOR N₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{2\pi m}$	$\frac{h^2}{2\pi m} - \frac{h^2}{RT}$	$5/2 \ln$	$\ln \frac{h^2}{2\pi m} - \ln \frac{h^2}{RT} - \ln \frac{h^2}{2\pi m}$	S°	$S^\circ - S^\circ$	$\ln \frac{h^2}{2\pi m} - \ln \frac{h^2}{RT} - \ln \frac{h^2}{2\pi m}$	$\ln \frac{h^2}{2\pi m} - \ln \frac{h^2}{RT} - \ln \frac{h^2}{2\pi m}$	TEMP. (°K)
20000	1.0000	2.50000	25.0526	27.5526	4.96791	49.7638	54.7517	5.9415E 04	9.9358E 04	20000
22000	1.0000	2.50000	25.2909	27.7909	4.96791	50.2522	55.2252	6.5571E 04	1.0923E 05	22000
24000	1.0000	2.50000	25.5085	28.0085	4.96791	50.6895	55.6554	7.1538E 04	1.2183E 06	24000
26000	1.0000	2.50000	25.7086	28.2086	4.96791	51.0872	56.0551	7.7499E 04	1.2917E 05	26000
28000	1.0000	2.50000	25.8938	28.3938	4.96791	51.4555	56.4232	8.3461E 04	1.3910E 05	28000
30000	1.0000	2.50000	26.0663	28.5663	4.96791	51.7981	56.7660	8.9422E 04	1.5539E 05	30000
32000	1.0000	2.50000	26.2277	28.7277	4.96791	52.1187	57.0866	9.5364E 04	1.5897E 05	32000
34000	1.0000	2.50000	26.3792	28.8792	4.96791	52.4199	57.3878	1.0135E 05	1.5891E 05	34000
36000	1.0000	2.50000	26.5221	29.0221	4.96791	52.7036	57.6717	1.0731E 05	1.7884E 05	36000
38000	1.0000	2.50000	26.6573	29.1573	4.96791	52.9724	57.9403	1.1327E 05	1.8878E 05	38000
40000	1.0000	2.50000	26.7855	29.2855	4.96791	53.2273	58.1952	1.1923E 05	1.9872E 05	40000
42000	1.0000	2.50000	26.9075	29.4075	4.96791	53.4656	58.4376	1.2519E 05	2.0865E 05	42000
44000	1.0000	2.50000	27.0238	29.5238	4.96791	53.7007	58.6687	1.3115E 05	2.1859E 05	44000
46000	1.0000	2.50000	27.1349	29.6349	4.96791	53.9216	58.8895	1.3711E 05	2.2852E 05	46000
48000	1.0000	2.50000	27.2413	29.7413	4.96791	54.1330	59.1009	1.4308E 05	2.3846E 05	48000
50000	1.0000	2.50000	27.3436	29.8436	4.96791	54.3358	59.3037	1.4904E 05	2.4840E 05	50000
52000	1.0000	2.50000	27.4420	29.9420	4.96791	54.5295	59.4974	1.5499E 05	2.5834E 05	52000
54000	1.0000	2.50000	27.5364	30.0364	4.96791	54.7146	59.6825	1.6094E 05	2.6828E 05	54000
56000	1.0000	2.50000	27.6272	30.1272	4.96791	54.8911	59.8590	1.6689E 05	2.7822E 05	56000
58000	1.0000	2.50000	27.7148	30.2148	4.96791	55.0590	60.0269	1.7284E 05	2.8816E 05	58000
60000	1.0000	2.50000	27.7992	30.2992	4.96791	55.2186	60.1863	1.7879E 05	2.9810E 05	60000
62000	1.0000	2.50000	27.8804	30.3804	4.96791	55.3697	60.3371	1.8474E 05	3.0804E 05	62000
64000	1.0000	2.50000	27.9584	30.4584	4.96791	55.5124	60.4797	1.9069E 05	3.1798E 05	64000
66000	1.0000	2.50000	28.0332	30.5332	4.96791	55.6467	60.6140	1.9664E 05	3.2792E 05	66000
68000	1.0000	2.50000	28.1048	30.6048	4.96791	55.7726	60.7400	2.0259E 05	3.3786E 05	68000
70000	1.0000	2.50000	28.1732	30.6732	4.96791	55.8901	60.8575	2.0854E 05	3.4780E 05	70000
72000	1.0000	2.50000	28.2384	30.7384	4.96791	56.0000	60.9664	2.1449E 05	3.5774E 05	72000
74000	1.0000	2.50000	28.3004	30.8004	4.96791	56.1024	61.0667	2.2044E 05	3.6768E 05	74000
76000	1.0000	2.50000	28.3592	30.8592	4.96791	56.2000	61.1590	2.2639E 05	3.7762E 05	76000
78000	1.0000	2.50000	28.4148	30.9148	4.96791	56.2924	61.2433	2.3234E 05	3.8756E 05	78000
80000	1.0000	2.50000	28.4672	30.9672	4.96791	56.3800	61.3196	2.3829E 05	3.9750E 05	80000
82000	1.0000	2.50000	28.5164	31.0164	4.96791	56.4624	61.3879	2.4424E 05	4.0744E 05	82000
84000	1.0000	2.50000	28.5624	31.0624	4.96791	56.5400	61.4482	2.5019E 05	4.1738E 05	84000
86000	1.0000	2.50000	28.6052	31.1052	4.96791	56.6124	61.5006	2.5614E 05	4.2732E 05	86000
88000	1.0000	2.50000	28.6448	31.1448	4.96791	56.6800	61.5449	2.6209E 05	4.3726E 05	88000
90000	1.0000	2.50000	28.6804	31.1804	4.96791	56.7424	61.5812	2.6804E 05	4.4720E 05	90000
92000	1.0000	2.50000	28.7128	31.2128	4.96791	56.8000	61.6175	2.7399E 05	4.5714E 05	92000
94000	1.0000	2.50000	28.7412	31.2412	4.96791	56.8524	61.6538	2.7994E 05	4.6708E 05	94000
96000	1.0000	2.50000	28.7664	31.2664	4.96791	56.9000	61.6800	2.8589E 05	4.7702E 05	96000
98000	1.0000	2.50000	28.7888	31.2888	4.96791	56.9424	61.7063	2.9184E 05	4.8696E 05	98000
100000	1.0000	2.50000	28.8080	31.3080	4.96791	56.9800	61.7325	2.9779E 05	4.9690E 05	100000
102000	1.0000	2.50000	28.8240	31.3240	4.96791	57.0124	61.7588	3.0374E 05	5.0684E 05	102000
104000	1.0000	2.50000	28.8372	31.3372	4.96791	57.0400	61.7850	3.0969E 05	5.1678E 05	104000
106000	1.0000	2.50000	28.8476	31.3476	4.96791	57.0624	61.8112	3.1564E 05	5.2672E 05	106000
108000	1.0000	2.50000	28.8552	31.3552	4.96791	57.0800	61.8375	3.2159E 05	5.3666E 05	108000
110000	1.0000	2.50000	28.8600	31.3600	4.96791	57.0924	61.8637	3.2754E 05	5.4660E 05	110000
112000	1.0000	2.50000	28.8624	31.3624	4.96791	57.1000	61.8899	3.3349E 05	5.5654E 05	112000
114000	1.0000	2.50000	28.8624	31.3624	4.96791	57.1024	61.9161	3.3944E 05	5.6648E 05	114000
116000	1.0000	2.50000	28.8600	31.3600	4.96791	57.1000	61.9423	3.4539E 05	5.7642E 05	116000
118000	1.0000	2.50000	28.8552	31.3552	4.96791	57.0924	61.9685	3.5134E 05	5.8636E 05	118000
120000	1.0000	2.50000	28.8476	31.3476	4.96791	57.0800	61.9947	3.5729E 05	5.9630E 05	120000
122000	1.0000	2.50000	28.8372	31.3372	4.96791	57.0624	62.0209	3.6324E 05	6.0624E 05	122000
124000	1.0000	2.50000	28.8240	31.3240	4.96791	57.0400	62.0471	3.6919E 05	6.1618E 05	124000
126000	1.0000	2.50000	28.8080	31.3080	4.96791	57.0124	62.0733	3.7514E 05	6.2612E 05	126000
128000	1.0000	2.50000	28.7888	31.2888	4.96791	56.9800	62.1000	3.8109E 05	6.3606E 05	128000
130000	1.0000	2.50000	28.7664	31.2664	4.96791	56.9424	62.1262	3.8704E 05	6.4600E 05	130000
132000	1.0000	2.50000	28.7412	31.2412	4.96791	56.9000	62.1525	3.9299E 05	6.5594E 05	132000
134000	1.0000	2.50000	28.7128	31.2128	4.96791	56.8524	62.1787	3.9894E 05	6.6588E 05	134000
136000	1.0000	2.50000	28.6800	31.1800	4.96791	56.8000	62.2050	4.0489E 05	6.7582E 05	136000
138000	1.0000	2.50000	28.6448	31.1448	4.96791	56.7424	62.2312	4.1084E 05	6.8576E 05	138000
140000	1.0000	2.50000	28.6052	31.1052	4.96791	56.6800	62.2575	4.1679E 05	6.9570E 05	140000
142000	1.0000	2.50000	28.5624	31.0624	4.96791	56.6124	62.2837	4.2274E 05	7.0564E 05	142000
144000	1.0000	2.50000	28.5164	31.0164	4.96791	56.5400	62.3100	4.2869E 05	7.1558E 05	144000
146000	1.0000	2.50000	28.4672	30.9672	4.96791	56.4624	62.3362	4.3464E 05	7.2552E 05	146000
148000	1.0000	2.50000	28.4148	30.9148	4.96791	56.3800	62.3625	4.4059E 05	7.3546E 05	148000
150000	1.0000	2.50000	28.3592	30.8592	4.96791	56.3000	62.3887	4.4654E 05	7.4540E 05	150000
152000	1.0000	2.50000	28.3004	30.8004	4.96791	56.2124	62.4150	4.5249E 05	7.5534E 05	152000
154000	1.0000	2.50000	28.2384	30.7384	4.96791	56.1200	62.4412	4.5844E 05	7.6528E 05	154000
156000	1.0000	2.50000	28.1732	30.6732	4.96791	56.0224	62.4675	4.6439E 05	7.7522E 05	156000
158000	1.0000	2.50000	28.1048	30.6048	4.96791	55.9248	62.4937	4.7034E 05	7.8516E 05	158000
160000	1.0000	2.50000	28.0332	30.5332	4.96791	55.8272	62.5200	4.7629E 05	7.9510E 05	160000
162000	1.0000	2.50000	27.9584	30.4584	4.96791	55.7296	62.5462	4.8224E 05	8.0504E 05	162000
164000	1.0000	2.50000	27.8804	30.3804	4.96791	55.6320	62.5725	4.8819E 05	8.1498E 05	164000
166000	1.0000	2.50000	27.7992	30.2992	4.96791	55.5344	62.5987	4.9414E 05	8.2492E 05	166000
168000	1.0000	2.50000	27.7148	30.2148	4.96791	55.4368	62.6250	5.0009E 05	8.3486E 05	168000
170000	1.0000	2.50000	27.6272	30.1272	4.96791	55.3392	62.6512	5.0604E 05	8.4480E 05	170000
172000	1.0000	2.50000	27.5364	30.0364	4.96791	55.2416	62.6775	5.1199E 05	8.5474E 05	172000
174000	1.0000	2.50000	27.4420	29.9420	4.96791	55.1440	62.7037	5.1794E 05	8.6468E 05	174000
176000	1.0000	2.50000	27.3436	29.8436	4.96791	55.0464	62.7300	5.2389E 05	8.7462E 05	176000
178000	1.0000	2.50000	27.2413	29.7413	4.96791	54.9488	62.7562	5.2984E 05	8.8456E 05	178000
180000	1.0000	2.50000	27.1349	29.6349	4.96791	54.8512	62.7825	5.3579E 05	8.9450E 05	180000
182000	1.0000	2.50000	27.0238	29.5238	4.96791	54.7536	62.8087	5.4174E 05	9.0444E 05	182000
184000	1.0000	2.50000	26.9075	29.4075	4.96791	54.6560	62.8350	5.4769E 05	9.1438E 05	184000
186000	1.0000	2.50000	26.7855	29.2855	4.96791	54.5584	62.8612	5.5364E 05	9.2432E 05	186000
188000	1.0000	2.50000	26.6573	29.1573	4.96791	54.4608	62.8875	5.5959E 05	9.3426E 05	188000
190000	1.0000	2.50000	26.5221	29.0221	4.96791	54.3632	62.9137	5.6554E 05	9.4420E 05	190000
192000	1.0000	2.50000	26.3792	28.8792	4.96791</					

TABLE 32. IDEAL GAS FUNCTIONS FOR O₂ (ATOMIC WEIGHT 15.9955, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 74 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	TEMP. (°K)
5000	2.0000	2.50000	22.4796	24.9796	4.96791	44.6708	49.8387	1.4904E 04	2.4840E 04	2.5833E 04	2.6336E 05	5000
5200	2.0000	2.50000	22.5777	25.0777	4.96791	44.8656	49.8335	1.5500E 04	2.5833E 04	2.6336E 05	2.6336E 05	5200
5400	2.0000	2.50000	22.6720	25.1720	4.96791	45.0531	50.0210	1.6096E 04	2.6827E 04	2.7329E 05	2.7329E 05	5400
5600	2.0000	2.50000	22.7630	25.2630	4.96791	45.2338	50.2017	1.6692E 04	2.7820E 04	2.7820E 05	2.7820E 05	5600
5800	2.0000	2.50000	22.8507	25.3507	4.96791	45.4081	50.3760	1.7288E 04	2.8814E 04	2.8337E 05	2.8337E 05	5800
6000	2.0000	2.50000	22.9354	25.4354	4.96791	45.5765	50.5444	1.7884E 04	2.9807E 04	2.7344E 05	2.7344E 05	6000
6200	2.0000	2.50000	23.0174	25.5174	4.96791	45.7394	50.7073	1.8481E 04	3.0801E 04	2.8354E 05	2.8354E 05	6200
6400	2.0000	2.50000	23.0968	25.5968	4.96791	45.8971	50.8650	1.9077E 04	3.1795E 04	2.9374E 05	2.9374E 05	6400
6600	2.0000	2.50000	23.1737	25.6737	4.96791	46.0500	51.0179	1.9673E 04	3.2788E 04	3.0393E 05	3.0393E 05	6600
6800	2.0000	2.50000	23.2483	25.7483	4.96791	46.1983	51.1662	2.0269E 04	3.3782E 04	3.1415E 05	3.1415E 05	6800
7000	2.0000	2.50000	23.3208	25.8208	4.96791	46.3423	51.3102	2.0865E 04	3.4775E 04	3.2440E 05	3.2440E 05	7000
7200	2.0000	2.50000	23.3912	25.8912	4.96791	46.4823	51.4502	2.1461E 04	3.5769E 04	3.3447E 05	3.3447E 05	7200
7400	2.0000	2.50000	23.4597	25.9597	4.96791	46.6184	51.5863	2.2058E 04	3.6763E 04	3.4498E 05	3.4498E 05	7400
7600	2.0000	2.50000	23.5264	26.0264	4.96791	46.7509	51.7188	2.2654E 04	3.7756E 04	3.5531E 05	3.5531E 05	7600
7800	2.0000	2.50000	23.5914	26.0914	4.96791	46.8799	51.8478	2.3250E 04	3.8752E 04	3.6568E 05	3.6568E 05	7800
8000	2.0000	2.50000	23.6546	26.1546	4.96791	47.0037	51.9736	2.3846E 04	3.9743E 04	3.7608E 05	3.7608E 05	8000
8200	2.0000	2.50000	23.7164	26.2164	4.96791	47.1284	52.0963	2.4442E 04	4.0737E 04	3.8644E 05	3.8644E 05	8200
8400	2.0000	2.50000	23.7766	26.2766	4.96791	47.2481	52.2160	2.5038E 04	4.1730E 04	3.9680E 05	3.9680E 05	8400
8600	2.0000	2.50000	23.8354	26.3354	4.96791	47.3650	52.3329	2.5634E 04	4.2724E 04	4.0734E 05	4.0734E 05	8600
8800	2.0000	2.50000	23.8929	26.3929	4.96791	47.4792	52.4471	2.6231E 04	4.3718E 04	4.1782E 05	4.1782E 05	8800
9000	2.0000	2.50000	23.9491	26.4491	4.96791	47.5908	52.5587	2.6827E 04	4.4711E 04	4.2832E 05	4.2832E 05	9000
9200	2.0000	2.50000	24.0040	26.5040	4.96791	47.7000	52.6679	2.7423E 04	4.5705E 04	4.3881E 05	4.3881E 05	9200
9400	2.0000	2.50000	24.0578	26.5578	4.96791	47.8069	52.7748	2.8019E 04	4.6698E 04	4.4930E 05	4.4930E 05	9400
9600	2.0000	2.50000	24.1104	26.6104	4.96791	47.9114	52.8794	2.8615E 04	4.7692E 04	4.5995E 05	4.5995E 05	9600
9800	2.0000	2.50000	24.1620	26.6620	4.96791	48.0139	52.9818	2.9211E 04	4.8686E 04	4.7054E 05	4.7054E 05	9800
10000	2.0000	2.50000	24.2125	26.7125	4.96791	48.1142	53.0823	2.9807E 04	4.9679E 04	4.8114E 05	4.8114E 05	10000
10500	2.0000	2.50000	24.3345	26.8345	4.96791	48.3586	53.3245	3.1298E 04	5.2163E 04	5.0774E 05	5.0774E 05	10500
11000	2.0000	2.50000	24.4508	26.9508	4.96791	48.5877	53.5557	3.2788E 04	5.4647E 04	5.3447E 05	5.3447E 05	11000
11500	2.0000	2.50000	24.5619	27.0619	4.96791	48.8086	53.7765	3.4279E 04	5.7131E 04	5.6136E 05	5.6136E 05	11500
12000	2.0000	2.50000	24.6683	27.1683	4.96791	49.0200	53.9879	3.5769E 04	5.9615E 04	5.8824E 05	5.8824E 05	12000
12500	2.0000	2.50000	24.7704	27.2704	4.96791	49.2228	54.1907	3.7259E 04	6.2099E 04	6.1529E 05	6.1529E 05	12500
13000	2.0000	2.50000	24.8684	27.3684	4.96791	49.4177	54.3856	3.8750E 04	6.4583E 04	6.4243E 05	6.4243E 05	13000
13500	2.0000	2.50000	24.9628	27.4628	4.96791	49.6051	54.5731	4.0240E 04	6.7067E 04	6.6967E 05	6.6967E 05	13500
14000	2.0000	2.50000	25.0537	27.5537	4.96791	49.7858	54.7537	4.1730E 04	6.9551E 04	6.9700E 05	6.9700E 05	14000
14500	2.0000	2.50000	25.1414	27.6414	4.96791	49.9601	54.9281	4.3221E 04	7.2035E 04	7.2442E 05	7.2442E 05	14500
15000	2.0000	2.50000	25.2262	27.7262	4.96791	50.1284	55.0965	4.4711E 04	7.4519E 04	7.5193E 05	7.5193E 05	15000
15500	2.0000	2.50000	25.3081	27.8081	4.96791	50.2915	55.2594	4.6202E 04	7.7003E 04	7.7952E 05	7.7952E 05	15500
16000	2.0000	2.50000	25.3875	27.8875	4.96791	50.4492	55.4171	4.7682E 04	7.9487E 04	8.0719E 05	8.0719E 05	16000
16500	2.0000	2.50000	25.4644	27.9644	4.96791	50.6021	55.5700	4.9162E 04	8.1971E 04	8.3493E 05	8.3493E 05	16500
17000	2.0000	2.50000	25.5391	28.0391	4.96791	50.7504	55.7183	5.0635E 04	8.4453E 04	8.6276E 05	8.6276E 05	17000
17500	2.0000	2.50000	25.6115	28.1115	4.96791	50.8944	55.8623	5.2103E 04	8.6938E 04	8.9065E 05	8.9065E 05	17500
18000	2.0000	2.50000	25.6820	28.1820	4.96791	51.0343	56.0022	5.3573E 04	8.9422E 04	9.1864E 05	9.1864E 05	18000
18500	2.0000	2.50000	25.7505	28.2505	4.96791	51.1704	56.1384	5.5044E 04	9.1906E 04	9.4665E 05	9.4665E 05	18500
19000	2.0000	2.50000	25.8171	28.3171	4.96791	51.3029	56.2708	5.6534E 04	9.4390E 04	9.7478E 05	9.7478E 05	19000
19500	2.0000	2.50000	25.8821	28.3821	4.96791	51.4320	56.3999	5.8025E 04	9.6874E 04	1.0029E 06	1.0029E 06	19500

TABLE 32 (CONT.) IDEAL GAS FUNCTIONS FOR U₁

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0 - U}{RT}$	$-\frac{U^0 - U}{RT}$	$\frac{S^0}{R}$	$\ln^0 - \frac{U^0 - U}{RT} - \ln^0 - \frac{U^0 - U}{RT}$	$-\ln^0 - \frac{U^0 - U}{RT}$	$-\ln^0 - \frac{U^0 - U}{RT}$	$-\ln^0 - \frac{U^0 - U}{RT}$	$-\ln^0 - \frac{U^0 - U}{RT}$	TEMP. (°K)	
20000	2.0000	2.50600	25.9454	28.4454	4.96791	51.5577	56.5257	5.9619E 04	9.9350E 04	1.0312E 06	20000
22000	2.0000	2.50000	26.1836	28.6836	4.96791	52.0312	56.9992	6.9576E 04	1.0929E 05	1.1447E 06	22000
24000	2.0000	2.50000	26.4012	28.9012	4.96791	52.4835	57.4314	7.1530E 04	1.1923E 05	1.2591E 06	24000
26000	2.0000	2.50000	26.6013	29.1013	4.96791	52.8611	57.8291	7.7499E 04	1.2410E 05	1.3744E 06	26000
28000	2.0000	2.50000	26.7866	29.2866	4.96791	53.2293	58.1972	8.3461E 04	1.2910E 05	1.4904E 06	28000
30000	2.0000	2.50000	26.9590	29.4590	4.96791	53.5721	58.5400	8.9422E 04	1.3420E 05	1.6072E 06	30000
32000	2.0000	2.50000	27.1204	29.6204	4.96791	53.8927	58.8666	9.5384E 04	1.3937E 05	1.7246E 06	32000
34000	2.0000	2.50000	27.2719	29.7719	4.96791	54.1939	59.1818	1.0135E 05	1.4461E 05	1.8426E 06	34000
36000	2.0000	2.50000	27.4148	29.9148	4.96791	54.4778	59.4857	1.0731E 05	1.4994E 05	1.9612E 06	36000
38000	2.0000	2.50000	27.5500	30.0500	4.96791	54.7464	59.7713	1.1327E 05	1.5527E 05	2.0804E 06	38000
40000	2.0000	2.50000	27.6782	30.1782	4.96791	55.0012	59.9462	1.1923E 05	1.6059E 05	2.2000E 06	40000
42000	2.0000	2.50000	27.8002	30.3002	4.96791	55.2436	60.1115	1.2519E 05	1.6590E 05	2.3202E 06	42000
44000	2.0000	2.50000	27.9165	30.4165	4.96791	55.4747	60.2626	1.3115E 05	1.7120E 05	2.4409E 06	44000
46000	2.0000	2.50000	28.0276	30.5276	4.96791	55.6956	60.4035	1.3711E 05	1.7650E 05	2.5620E 06	46000
48000	2.0000	2.50000	28.1340	30.6340	4.96791	55.9070	60.5369	1.4308E 05	1.8179E 05	2.6835E 06	48000
50000	2.0000	2.50000	28.2361	30.7361	4.96791	56.1098	61.0777	1.4904E 05	1.8707E 05	2.8055E 06	50000
60000	2.0000	2.50000	28.6919	31.1919	4.96791	57.0156	61.9835	1.7884E 05	2.0807E 05	3.4209E 06	60000
70000	2.0000	2.50000	29.0773	31.5773	4.96791	57.7814	62.7493	2.0865E 05	2.3773E 05	4.0447E 06	70000
80000	2.0000	2.50000	29.4111	31.9111	4.96791	58.4447	63.4126	2.3846E 05	2.6743E 05	4.6756E 06	80000
90000	2.0000	2.50000	29.7056	32.2056	4.96791	59.0299	63.9978	2.6827E 05	2.9711E 05	5.3127E 06	90000
100000	2.0000	2.50000	29.9690	32.4690	4.96791	59.5533	64.5212	2.9807E 05	3.2679E 05	5.9553E 06	100000
150000	2.0000	2.50000	30.9826	33.4826	4.96791	61.5676	66.5365	4.4711E 05	4.7519E 05	9.2351E 06	150000
200000	2.0000	2.50000	31.7018	34.2018	4.96791	62.9968	67.9647	5.9615E 05	6.2459E 05	1.2599E 07	200000
300000	2.0000	2.50000	32.7155	35.2155	4.96791	65.0111	69.9790	8.9422E 05	9.2351E 05	1.9503E 07	300000
400000	2.0000	2.50000	33.4347	35.9347	4.96791	66.6403	71.6082	1.1923E 06	1.1923E 06	2.6576E 07	400000
500000	2.0000	2.50002	33.9926	36.4926	4.96735	67.5688	72.5168	1.4904E 06	1.4904E 06	3.3774E 07	500000
600000	2.0000	2.50024	34.4484	36.9484	4.96839	68.4546	73.4230	1.7884E 06	1.7884E 06	4.1073E 07	600000
800000	2.0011	2.50598	35.1681	37.6737	4.97899	69.8848	74.8638	2.3959E 06	2.3959E 06	5.5908E 07	800000
1000000	2.0088	2.53798	35.7298	38.2355	5.00129	71.0010	76.0423	3.0541E 06	3.0541E 06	7.1001E 07	1000000
1500000	2.1535	2.91365	36.8130	39.3267	5.78991	73.1535	78.9435	5.7041E 06	5.7041E 06	1.0973E 08	1500000
2000000	2.6609	3.59459	37.7438	41.2484	7.14305	75.0032	82.1443	1.0312E 07	1.0312E 07	1.5001E 08	2000000
3000000	4.8951	4.25653	39.3670	43.8236	8.45842	78.2288	86.6872	1.9414E 07	1.9414E 07	2.3469E 08	3000000
4000000	8.0943	4.18532	40.5892	44.7745	8.31692	80.4574	88.9743	2.5319E 07	2.5319E 07	3.2263E 08	4000000
5000000	11.5415	3.98451	41.5018	45.9443	7.91787	82.4710	90.3889	2.9654E 07	2.9654E 07	4.1235E 08	5000000
6000000	14.8739	3.79748	42.2113	46.0088	7.54622	83.8808	91.4270	3.3554E 07	3.3554E 07	5.0328E 08	6000000
8000000	20.7345	3.51801	43.2627	46.7907	6.99086	85.9701	92.9610	4.0030E 07	4.0030E 07	6.8776E 08	8000000
10000000	25.4728	3.33161	44.0264	47.3580	6.62046	87.4876	94.1081	4.6333E 07	4.6333E 07	8.7488E 08	10000000

TABLE 33. IDEAL GAS FUNCTIONS FOR AR 76 (ATOMIC WEIGHT 39.9440, $R = 1.98717$ CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 75 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{h^2 E}{RT}$	$\frac{h^2 E}{RT} - \frac{h^2 E_0}{RT}$	$\frac{h^2 E}{RT} - \frac{h^2 E_0}{RT} - \frac{h^2 E_1}{RT}$	$\frac{h^2 E}{RT} - \frac{h^2 E_0}{RT} - \frac{h^2 E_1}{RT} - \frac{h^2 E_2}{RT}$	$\frac{h^2 E}{RT} - \frac{h^2 E_0}{RT} - \frac{h^2 E_1}{RT} - \frac{h^2 E_2}{RT} - \frac{h^2 E_3}{RT}$	$\frac{h^2 E}{RT} - \frac{h^2 E_0}{RT} - \frac{h^2 E_1}{RT} - \frac{h^2 E_2}{RT} - \frac{h^2 E_3}{RT} - \frac{h^2 E_4}{RT}$	$\frac{h^2 E}{RT} - \frac{h^2 E_0}{RT} - \frac{h^2 E_1}{RT} - \frac{h^2 E_2}{RT} - \frac{h^2 E_3}{RT} - \frac{h^2 E_4}{RT} - \frac{h^2 E_5}{RT}$	TEMP. (°K)
5000	2.0000	2.50000	23.8524	4.96791	46.3524	47.3944	52.3644	1.49044	5000
5200	2.0000	2.50000	23.9504	4.96791	46.4504	47.4924	52.4624	1.49044	5200
5400	2.0000	2.50000	24.0484	4.96791	46.5484	47.5904	52.5344	1.49044	5400
5600	2.0000	2.50000	24.1464	4.96791	46.6464	47.6884	52.6064	1.49044	5600
5800	2.0000	2.50000	24.2444	4.96791	46.7444	47.7864	52.6784	1.49044	5800
6000	2.0000	2.50000	24.3424	4.96791	46.8424	47.8844	52.7504	1.49044	6000
6200	2.0000	2.50000	24.4404	4.96791	46.9404	47.9824	52.8224	1.49044	6200
6400	2.0000	2.50000	24.5384	4.96791	47.0384	48.0804	52.8944	1.49044	6400
6600	2.0000	2.50000	24.6364	4.96791	47.1364	48.1784	52.9664	1.49044	6600
6800	2.0000	2.50000	24.7344	4.96791	47.2344	48.2764	53.0384	1.49044	6800
7000	2.0000	2.50000	24.8324	4.96791	47.3324	48.3744	53.1104	1.49044	7000
7200	2.0000	2.50000	24.9304	4.96791	47.4304	48.4724	53.1824	1.49044	7200
7400	2.0000	2.50000	25.0284	4.96791	47.5284	48.5704	53.2544	1.49044	7400
7600	2.0000	2.50000	25.1264	4.96791	47.6264	48.6684	53.3264	1.49044	7600
7800	2.0000	2.50000	25.2244	4.96791	47.7244	48.7664	53.3984	1.49044	7800
8000	2.0000	2.50000	25.3224	4.96791	47.8224	48.8644	53.4704	1.49044	8000
8200	2.0000	2.50000	25.4204	4.96791	47.9204	48.9624	53.5424	1.49044	8200
8400	2.0000	2.50000	25.5184	4.96791	48.0184	49.0604	53.6144	1.49044	8400
8600	2.0000	2.50000	25.6164	4.96791	48.1164	49.1584	53.6864	1.49044	8600
8800	2.0000	2.50000	25.7144	4.96791	48.2144	49.2564	53.7584	1.49044	8800
9000	2.0000	2.50000	25.8124	4.96791	48.3124	49.3544	53.8304	1.49044	9000
9200	2.0000	2.50000	25.9104	4.96791	48.4104	49.4524	53.9024	1.49044	9200
9400	2.0000	2.50000	26.0084	4.96791	48.5084	49.5504	53.9744	1.49044	9400
9600	2.0000	2.50000	26.1064	4.96791	48.6064	49.6484	54.0464	1.49044	9600
9800	2.0000	2.50000	26.2044	4.96791	48.7044	49.7464	54.1184	1.49044	9800
10000	2.0000	2.50000	26.3024	4.96791	48.8024	49.8444	54.1904	1.49044	10000
10500	2.0000	2.50000	26.4004	4.96791	48.9004	49.9424	54.2624	1.49044	10500
11000	2.0000	2.50000	26.4984	4.96791	49.0004	50.0404	54.3344	1.49044	11000
11500	2.0000	2.50000	26.5964	4.96791	49.1004	50.1384	54.4064	1.49044	11500
12000	2.0000	2.50000	26.6944	4.96791	49.2004	50.2364	54.4784	1.49044	12000
12500	2.0000	2.50000	26.7924	4.96791	49.3004	50.3344	54.5504	1.49044	12500
13000	2.0000	2.50000	26.8904	4.96791	49.4004	50.4324	54.6224	1.49044	13000
13500	2.0000	2.50000	26.9884	4.96791	49.5004	50.5304	54.6944	1.49044	13500
14000	2.0000	2.50000	27.0864	4.96791	49.6004	50.6284	54.7664	1.49044	14000
14500	2.0000	2.50000	27.1844	4.96791	49.7004	50.7264	54.8384	1.49044	14500
15000	2.0000	2.50000	27.2824	4.96791	49.8004	50.8244	54.9104	1.49044	15000
15500	2.0000	2.50000	27.3804	4.96791	49.9004	50.9224	54.9824	1.49044	15500
16000	2.0000	2.50000	27.4784	4.96791	50.0004	51.0204	55.0544	1.49044	16000
16500	2.0000	2.50000	27.5764	4.96791	50.1004	51.1184	55.1264	1.49044	16500
17000	2.0000	2.50000	27.6744	4.96791	50.2004	51.2164	55.1984	1.49044	17000
17500	2.0000	2.50000	27.7724	4.96791	50.3004	51.3144	55.2704	1.49044	17500
18000	2.0000	2.50000	27.8704	4.96791	50.4004	51.4124	55.3424	1.49044	18000
18500	2.0000	2.50000	27.9684	4.96791	50.5004	51.5104	55.4144	1.49044	18500
19000	2.0000	2.50000	28.0664	4.96791	50.6004	51.6084	55.4864	1.49044	19000
19500	2.0000	2.50000	28.1644	4.96791	50.7004	51.7064	55.5584	1.49044	19500

TABLE 33 (CONT.). IDEAL GAS FUNCTIONS FOR AIR 70

TEMP. (°F)	PARTIT. FUNCT.	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	$\frac{h^0 - h^0}{RT}$	TEMP. (°F)
20000	2.0002	2.50113	27.3182	29.0194	4.97016	54.2859	59.2560	5.94406	04	9.94036	04	1.06576	06	20000
22000	2.0006	2.50267	27.5567	30.0593	4.97308	54.7597	59.7328	6.56906	04	1.09416	05	1.20476	06	22000
24000	2.0012	2.50516	27.7765	30.2797	4.97817	55.1926	60.1708	7.17846	04	1.19486	05	1.32446	04	24000
26000	2.0023	2.50916	27.9752	30.4864	4.98612	55.5914	60.5775	7.79736	04	1.29646	05	1.44546	04	26000
28000	2.0041	2.51489	28.1614	30.6762	4.99751	55.9613	60.9588	8.42906	04	1.39936	05	1.56696	04	28000
30000	2.0067	2.52256	28.3351	30.8577	5.01276	56.3064	61.3193	9.07686	04	1.50386	05	1.68926	04	30000
32000	2.0102	2.53234	28.4962	31.0306	5.03217	56.6307	61.6628	9.74406	04	1.61036	05	1.81226	04	32000
34000	2.0148	2.54421	28.6521	31.1963	5.05571	56.9364	61.9922	1.04336	05	1.71906	05	1.93506	04	34000
36000	2.0207	2.55816	28.7979	31.3560	5.08348	57.2262	62.3097	1.11476	05	1.83016	05	2.06016	04	36000
38000	2.0279	2.57406	28.9366	31.5107	5.11508	57.5019	62.6169	1.18846	05	1.94376	05	2.18516	04	38000
40000	2.0365	2.59176	29.0691	31.6609	5.15025	57.7651	62.9134	1.26526	05	2.06016	05	2.31046	04	40000
42000	2.0466	2.61105	29.1960	31.8071	5.18859	58.0173	63.2029	1.34446	05	2.17926	05	2.43676	04	42000
44000	2.0582	2.63172	29.3179	31.9497	5.22967	58.2596	63.4893	1.42976	05	2.30116	05	2.56346	04	44000
46000	2.0713	2.65356	29.4356	32.0890	5.27303	58.4930	63.7661	1.51156	05	2.42546	05	2.69076	04	46000
48000	2.0858	2.67628	29.5498	32.2251	5.31822	58.7164	64.0366	1.59896	05	2.55276	05	2.81896	04	48000
50000	2.1019	2.69973	29.6585	32.3583	5.36480	58.9364	64.3012	1.68806	05	2.68246	05	2.94686	04	50000
52000	2.2233	2.82102	30.1615	32.7025	5.60583	59.9358	65.5416	2.17126	05	3.36356	05	3.58616	04	52000
54000	2.3357	2.93725	30.6092	33.3624	5.83480	60.8176	66.6544	2.69476	05	4.08586	05	4.25726	04	54000
56000	2.4932	3.04018	31.2043	34.0445	6.06135	61.6106	67.6320	3.25336	05	4.83316	05	4.92896	04	56000
58000	2.6709	3.12792	31.3376	34.6955	6.21569	62.3326	68.5483	3.80576	05	5.59416	05	5.60996	04	58000
60000	2.8648	3.20150	31.7011	34.9026	6.36190	62.9953	69.3572	4.37476	05	6.36196	05	6.29996	04	60000
62000	3.0993	3.25014	33.0484	34.6785	6.81625	65.6726	72.4088	7.24346	04	1.02246	04	9.85096	04	62000
64000	3.3193	3.28468	34.6528	37.5993	7.04744	67.6695	74.7159	1.01216	04	1.40996	04	1.35346	07	64000
66000	3.2892	3.31765	35.5101	39.1277	7.18886	70.5444	77.7532	1.56476	04	2.15476	04	2.11696	07	66000
68000	11.3769	3.56975	36.5459	40.1156	7.09368	72.6227	79.7164	2.04246	04	2.83756	04	2.90496	07	68000
70000	16.3150	3.68366	37.3335	40.8171	6.92258	74.1878	81.1104	2.46776	04	3.46136	04	3.70946	07	70000
72000	16.9809	3.79437	37.9687	41.3550	6.76519	75.6361	82.1793	2.85406	04	4.04716	04	4.52406	07	72000
74000	21.5013	3.84185	38.9153	42.1871	6.64210	77.3311	83.7732	3.56396	04	5.15376	04	6.18656	07	74000
76000	25.0462	3.82729	39.6228	42.7531	6.52144	78.7429	84.9574	4.22736	04	6.22736	04	7.87936	07	76000
78000	31.0990	3.75762	40.8559	43.6033	6.40572	81.1874	87.0444	5.60406	04	8.78536	04	1.21786	08	78000
80000	34.8413	2.64614	41.6887	44.5348	6.29575	82.8424	88.4901	7.33726	04	1.13116	07	1.45486	08	80000
82000	39.1895	2.73799	42.8195	45.5571	6.19094	85.0894	90.5294	1.03596	07	1.63206	07	2.55276	08	82000
84000	41.5338	2.80808	43.5985	46.2792	6.10066	86.6374	91.9664	1.33596	07	2.13086	07	3.44556	08	84000
86000	43.1204	2.84572	44.1926	46.6386	6.02574	87.5749	93.0756	1.63576	07	2.62876	07	4.39096	08	86000
88000	44.1834	2.82206	44.6728	47.2969	5.95952	88.7722	93.9827	1.93406	07	3.12636	07	5.32636	08	88000
90000	45.5372	2.59217	45.6226	48.0140	5.91506	90.2622	95.4133	2.53116	07	4.12006	07	7.22106	08	90000
1000000	46.4065	2.57462	45.9984	48.5790	5.11560	91.4875	96.5225	3.12786	07	5.11560	07	9.14076	08	1000000

TABLE 34. IDEAL GAS FUNCTIONS FOR O₂. IONIC WEIGHT 15.9950, R = 1.98717 CAL/MOLE I
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS 4, 5, 4.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{W^0 - E^0}{RT}$	$\ln \frac{W^0 - E^0}{RT}$	$\ln \frac{W^0 - E^0}{RT} - \ln \frac{W^0 - E^0}{RT}$	$\ln \frac{W^0 - E^0}{RT} - \ln \frac{W^0 - E^0}{RT}$	$\ln \frac{W^0 - E^0}{RT} - \ln \frac{W^0 - E^0}{RT}$	$\ln \frac{W^0 - E^0}{RT} - \ln \frac{W^0 - E^0}{RT}$	TEMP. (°K)
5000	1.0000	21.7864	24.2464	4.46791	43.2933	40.2612	1.4904E 04	5000
5200	1.0000	21.8045	24.1945	4.46791	43.4881	40.2612	1.4904E 04	5200
5400	1.0000	21.8226	24.1426	4.46791	43.6829	40.2612	1.4904E 04	5400
5600	1.0000	21.8407	24.0907	4.46791	43.8777	40.2612	1.4904E 04	5600
5800	1.0000	21.8588	24.0388	4.46791	44.0725	40.2612	1.4904E 04	5800
6000	1.0000	21.8769	23.9869	4.46791	44.2673	40.2612	1.4904E 04	6000
6200	1.0000	21.8950	23.9350	4.46791	44.4621	40.2612	1.4904E 04	6200
6400	1.0000	21.9131	23.8831	4.46791	44.6569	40.2612	1.4904E 04	6400
6600	1.0000	21.9312	23.8312	4.46791	44.8517	40.2612	1.4904E 04	6600
6800	1.0000	21.9493	23.7793	4.46791	45.0465	40.2612	1.4904E 04	6800
7000	1.0000	21.9674	23.7274	4.46791	45.2413	40.2612	1.4904E 04	7000
7200	1.0000	21.9855	23.6755	4.46791	45.4361	40.2612	1.4904E 04	7200
7400	1.0000	21.9996	23.6236	4.46791	45.6309	40.2612	1.4904E 04	7400
7600	1.0000	22.0137	23.5717	4.46791	45.8257	40.2612	1.4904E 04	7600
7800	1.0000	22.0278	23.5198	4.46791	46.0205	40.2612	1.4904E 04	7800
8000	1.0000	22.0419	23.4679	4.46791	46.2153	40.2612	1.4904E 04	8000
8200	1.0000	22.0560	23.4160	4.46791	46.4101	40.2612	1.4904E 04	8200
8400	1.0000	22.0701	23.3641	4.46791	46.6049	40.2612	1.4904E 04	8400
8600	1.0000	22.0842	23.3122	4.46791	46.7997	40.2612	1.4904E 04	8600
8800	1.0000	22.0983	23.2603	4.46791	46.9945	40.2612	1.4904E 04	8800
9000	1.0000	22.1124	23.2084	4.46791	47.1893	40.2612	1.4904E 04	9000
9200	1.0000	22.1265	23.1565	4.46791	47.3841	40.2612	1.4904E 04	9200
9400	1.0000	22.1406	23.1046	4.46791	47.5789	40.2612	1.4904E 04	9400
9600	1.0000	22.1547	23.0527	4.46791	47.7737	40.2612	1.4904E 04	9600
9800	1.0000	22.1688	23.0008	4.46791	47.9685	40.2612	1.4904E 04	9800
10000	1.0000	22.1829	22.9489	4.46791	48.1633	40.2612	1.4904E 04	10000
10500	1.0000	22.2410	22.8860	4.46791	48.3581	40.2612	1.4904E 04	10500
11000	1.0000	22.2991	22.8241	4.46791	48.5529	40.2612	1.4904E 04	11000
11500	1.0000	22.3572	22.7622	4.46791	48.7477	40.2612	1.4904E 04	11500
12000	1.0000	22.4153	22.7003	4.46791	48.9425	40.2612	1.4904E 04	12000
12500	1.0000	22.4734	22.6384	4.46791	49.1373	40.2612	1.4904E 04	12500
13000	1.0000	22.5315	22.5765	4.46791	49.3321	40.2612	1.4904E 04	13000
13500	1.0000	22.5896	22.5146	4.46791	49.5269	40.2612	1.4904E 04	13500
14000	1.0000	22.6477	22.4527	4.46791	49.7217	40.2612	1.4904E 04	14000
14500	1.0000	22.7058	22.3908	4.46791	49.9165	40.2612	1.4904E 04	14500
15000	1.0000	22.7639	22.3289	4.46791	50.1113	40.2612	1.4904E 04	15000
15500	1.0000	22.8220	22.2670	4.46791	50.3061	40.2612	1.4904E 04	15500
16000	1.0000	22.8801	22.2051	4.46791	50.5009	40.2612	1.4904E 04	16000
16500	1.0000	22.9382	22.1432	4.46791	50.6957	40.2612	1.4904E 04	16500
17000	1.0000	22.9963	22.0813	4.46791	50.8905	40.2612	1.4904E 04	17000
17500	1.0000	23.0544	22.0194	4.46791	51.0853	40.2612	1.4904E 04	17500
18000	1.0000	23.1125	21.9575	4.46791	51.2801	40.2612	1.4904E 04	18000
18500	1.0000	23.1706	21.8956	4.46791	51.4749	40.2612	1.4904E 04	18500
19000	1.0000	23.2287	21.8337	4.46791	51.6697	40.2612	1.4904E 04	19000
19500	1.0000	23.2868	21.7718	4.46791	51.8645	40.2612	1.4904E 04	19500

TABLE 34 (CONT'D.). IDEAL GAS FUNCTIONS FOR O.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	TEMP. (°K)
20000	1.0000	25.2522	27.7527	4.96791	50.1803	55.1402	5.9619E 04	9.9350E 04	1.0034E 04	1.0034E 04	20000
22000	1.0000	25.4905	27.9905	4.96791	50.4537	55.4217	6.5570E 04	1.0942E 05	1.1144E 04	1.1144E 04	22000
24000	1.0000	25.7080	28.2080	4.96791	51.0860	56.0559	7.1530E 04	1.1923E 05	1.2261E 04	1.2261E 04	24000
26000	1.0000	25.9081	28.4081	4.96791	51.4837	56.4516	7.7499E 04	1.2917E 05	1.3306E 04	1.3306E 04	26000
28000	1.0000	26.0934	28.5934	4.96791	51.8518	56.8197	8.3461E 04	1.3911E 05	1.4519E 04	1.4519E 04	28000
30000	1.0000	26.2658	28.7658	4.96791	52.1946	57.1625	8.9427E 04	1.4904E 05	1.5628E 04	1.5628E 04	30000
32000	1.0000	26.4272	28.9272	4.96791	52.5152	57.4831	9.5344E 04	1.5897E 05	1.6736E 04	1.6736E 04	32000
34000	1.0000	26.5787	29.0787	4.96791	52.8164	57.7843	1.0135E 05	1.6891E 05	1.7845E 04	1.7845E 04	34000
36000	1.0000	26.7216	29.2216	4.96791	53.1003	58.0682	1.0731E 05	1.7884E 05	1.9116E 04	1.9116E 04	36000
38000	1.0000	26.8568	29.3568	4.96791	53.3689	58.3368	1.1327E 05	1.8878E 05	2.0220E 04	2.0220E 04	38000
40000	1.0000	26.9850	29.4850	4.96791	53.6237	58.5917	1.1923E 05	1.9872E 05	2.1449E 04	2.1449E 04	40000
42000	1.0000	27.1070	29.6070	4.96791	53.8661	58.8340	1.2519E 05	2.0865E 05	2.2623E 04	2.2623E 04	42000
44000	1.0000	27.2233	29.7233	4.96791	54.0972	59.0652	1.3115E 05	2.1859E 05	2.3803E 04	2.3803E 04	44000
46000	1.0000	27.3345	29.8345	4.96791	54.3181	59.2860	1.3711E 05	2.2852E 05	2.4984E 04	2.4984E 04	46000
48000	1.0000	27.4408	29.9408	4.96791	54.5295	59.4974	1.4308E 05	2.3846E 05	2.6174E 04	2.6174E 04	48000
50000	1.0000	27.5429	30.0429	4.96791	54.7323	59.7002	1.4904E 05	2.4840E 05	2.7364E 04	2.7364E 04	50000
60000	1.0000	27.9987	30.4987	4.96791	55.6381	60.6060	1.7884E 05	2.9872E 05	3.3381E 04	3.3381E 04	60000
70000	1.0000	28.3841	30.8841	4.96791	56.4039	61.3718	2.0865E 05	3.4917E 05	3.9483E 04	3.9483E 04	70000
80000	1.0000	28.7119	31.2119	4.96791	57.0872	62.0352	2.3846E 05	3.9753E 05	4.5484E 04	4.5484E 04	80000
90000	1.0000	29.0124	31.5124	4.96791	57.6524	62.6203	2.6827E 05	4.4711E 05	5.1887E 04	5.1887E 04	90000
100000	1.0000	29.2758	31.7758	4.96791	58.1758	63.1437	2.9807E 05	4.9679E 05	5.8176E 04	5.8176E 04	100000
150000	1.0000	30.2894	32.7894	4.96791	60.1901	65.1580	4.4711E 05	7.4519E 05	9.0285E 04	9.0285E 04	150000
200000	1.0000	31.0086	33.5086	4.96791	61.6191	66.5872	5.9615E 05	9.9350E 05	1.2324E 07	1.2324E 07	200000
300000	1.0000	32.0223	34.5223	4.96791	63.6326	68.6015	8.9427E 05	1.4904E 06	1.9095E 07	1.9095E 07	300000
400000	1.0000	32.7415	35.2415	4.96791	65.0628	70.0307	1.1923E 06	1.9872E 06	2.4025E 07	2.4025E 07	400000
500000	1.0000	33.2994	35.7994	4.96791	66.1713	71.1393	1.4904E 06	2.4840E 06	3.3064E 07	3.3064E 07	500000
600000	1.0000	33.7552	36.2552	4.96791	67.0771	72.0450	1.7884E 06	2.9872E 06	4.0244E 07	4.0244E 07	600000
800000	1.0000	34.7744	36.2744	4.96791	68.5063	73.4742	2.3846E 06	3.9753E 06	5.4005E 07	5.4005E 07	800000
1000000	1.0000	37.5322	37.5322	4.96791	69.6168	74.5828	2.9807E 06	4.9679E 06	6.9615E 07	6.9615E 07	1000000
1500000	1.0000	36.0459	38.5459	4.96791	71.6292	76.5971	4.4711E 06	7.4519E 06	1.0744E 08	1.0744E 08	1500000
2000000	1.0000	36.7451	39.2451	4.96791	73.0583	78.0263	5.9615E 06	9.9350E 06	1.4612E 08	1.4612E 08	2000000
3000000	1.0000	37.7788	40.2788	4.96791	75.0727	80.0406	8.9427E 06	1.4904E 07	2.2522E 08	2.2522E 08	3000000
4000000	1.0000	38.4980	40.9980	4.96791	76.5018	81.6497	1.1923E 07	1.9872E 07	3.0401E 08	3.0401E 08	4000000
5000000	1.0000	39.0558	41.5558	4.96791	77.6104	82.7583	1.4904E 07	2.4840E 07	3.9003E 08	3.9003E 08	5000000
6000000	1.0000	39.5116	42.0116	4.96791	78.5161	83.6641	1.7884E 07	2.9872E 07	4.7110E 08	4.7110E 08	6000000
8000000	1.0000	40.2308	42.7308	4.96791	79.9453	84.9132	2.3846E 07	3.9753E 07	6.3954E 08	6.3954E 08	8000000
10000000	1.0000	40.7687	43.2687	4.96791	81.0539	86.0218	2.9807E 07	4.9679E 07	8.1054E 08	8.1054E 08	10000000

TABLE 35. IDEAL GAS FUNCTIONS FOR AR 0+ (ATOMIC WEIGHT 39.9440, $R = 1.98717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $N \leq 4$. SEE TABLE 76 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{W^0-E^0}{RT}$	$\ln W^0$	$\ln W^0 - \frac{E^0}{RT}$	$\ln W^0 - \frac{E^0}{RT} - \frac{E^0-E^0_0}{RT}$	$\ln W^0 - \frac{E^0}{RT} - \frac{E^0-E^0_0}{RT} - \frac{E^0-E^0_0}{RT}$	TEMP. (°K)
3000	1.0000	23.1592	25.6992	46.0212	50.0002	1.4904E 04	2.3011E 05
3200	1.0000	23.2573	25.7973	46.1261	51.1840	1.5000E 04	2.3032E 05
3400	1.0000	23.3516	25.8516	46.2036	51.3715	1.4894E 04	2.3058E 05
3600	1.0000	23.4428	25.9428	46.2791	51.5522	1.4788E 04	2.3087E 05
3800	1.0000	23.5303	26.0303	46.3561	51.7265	1.4681E 04	2.3120E 05
4000	1.0000	23.6150	26.1150	46.4341	51.8949	1.4574E 04	2.3154E 05
4200	1.0000	23.6970	26.1970	46.5136	52.0578	1.4466E 04	2.3189E 05
4400	1.0000	23.7764	26.2764	46.5939	52.2155	1.4357E 04	2.3225E 05
4600	1.0000	23.8533	26.3533	46.6759	52.3684	1.4247E 04	2.3262E 05
4800	1.0000	23.9280	26.4280	46.7594	52.5167	1.4136E 04	2.3299E 05
5000	1.0000	24.0004	26.5004	46.8444	52.6607	1.4024E 04	2.3336E 05
5200	1.0000	24.0709	26.5709	46.9309	52.8007	1.3911E 04	2.3373E 05
5400	1.0000	24.1394	26.6394	47.0189	52.9368	1.3797E 04	2.3410E 05
5600	1.0000	24.2060	26.7060	47.1084	53.0693	1.3682E 04	2.3447E 05
5800	1.0000	24.2710	26.7710	47.1994	53.1983	1.3566E 04	2.3484E 05
6000	1.0000	24.3343	26.8343	47.2919	53.3241	1.3449E 04	2.3521E 05
6200	1.0000	24.3960	26.8960	47.3859	53.4468	1.3331E 04	2.3558E 05
6400	1.0000	24.4562	26.9562	47.4814	53.5668	1.3212E 04	2.3595E 05
6600	1.0000	24.5151	27.0151	47.5784	53.6834	1.3092E 04	2.3632E 05
6800	1.0000	24.5725	27.0725	47.6769	53.7976	1.2971E 04	2.3669E 05
7000	1.0000	24.6287	27.1287	47.7769	53.9092	1.2849E 04	2.3706E 05
7200	1.0000	24.6837	27.1837	47.8784	54.0184	1.2726E 04	2.3743E 05
7400	1.0000	24.7374	27.2374	47.9814	54.1253	1.2602E 04	2.3780E 05
7600	1.0000	24.7901	27.2901	48.0859	54.2299	1.2477E 04	2.3817E 05
7800	1.0000	24.8416	27.3416	48.1919	54.3323	1.2351E 04	2.3854E 05
8000	1.0000	24.8921	27.3921	48.2994	54.4327	1.2224E 04	2.3891E 05
8200	1.0000	24.9416	27.4416	48.4084	54.5304	1.2096E 04	2.3928E 05
8400	1.0000	24.9894	27.4894	48.5189	54.6257	1.1967E 04	2.3965E 05
8600	1.0000	25.0357	27.5357	48.6309	54.7187	1.1837E 04	2.4002E 05
8800	1.0000	25.0804	27.5804	48.7444	54.8094	1.1706E 04	2.4039E 05
9000	1.0000	25.1236	27.6236	48.8594	54.8979	1.1574E 04	2.4076E 05
9200	1.0000	25.1653	27.6653	48.9759	54.9843	1.1441E 04	2.4113E 05
9400	1.0000	25.2056	27.7056	49.0939	55.0687	1.1307E 04	2.4150E 05
9600	1.0000	25.2444	27.7444	49.2134	55.1512	1.1172E 04	2.4187E 05
9800	1.0000	25.2817	27.7817	49.3344	55.2317	1.1036E 04	2.4224E 05
10000	1.0000	25.3176	27.8176	49.4569	55.3094	1.0900E 04	2.4261E 05
10500	1.0000	25.3521	27.8521	49.5809	55.3843	1.0763E 04	2.4298E 05
11000	1.0000	25.3852	27.8852	49.7064	55.4567	1.0625E 04	2.4335E 05
11500	1.0000	25.4169	27.9169	49.8334	55.5267	1.0486E 04	2.4372E 05
12000	1.0000	25.4472	27.9472	49.9619	55.5943	1.0346E 04	2.4409E 05
12500	1.0000	25.4761	27.9761	50.0919	55.6597	1.0205E 04	2.4446E 05
13000	1.0000	25.5036	28.0036	50.2234	55.7231	1.0063E 04	2.4483E 05
13500	1.0000	25.5297	28.0297	50.3564	55.7845	9.9200E 03	2.4520E 05
14000	1.0000	25.5544	28.0544	50.4909	55.8439	9.7816E 03	2.4557E 05
14500	1.0000	25.5777	28.0777	50.6269	55.9014	9.6411E 03	2.4594E 05
15000	1.0000	25.5997	28.0997	50.7644	55.9571	9.4986E 03	2.4631E 05
15500	1.0000	25.6204	28.1204	50.9034	56.0111	9.3541E 03	2.4668E 05
16000	1.0000	25.6397	28.1397	51.0439	56.0634	9.2076E 03	2.4705E 05
16500	1.0000	25.6577	28.1577	51.1869	56.1141	9.0591E 03	2.4742E 05
17000	1.0000	25.6744	28.1744	51.3324	56.1634	8.9086E 03	2.4779E 05
17500	1.0000	25.6897	28.1897	51.4794	56.2112	8.7561E 03	2.4816E 05
18000	1.0000	25.7037	28.2037	51.6279	56.2577	8.6016E 03	2.4853E 05
18500	1.0000	25.7164	28.2164	51.7779	56.3029	8.4451E 03	2.4890E 05
19000	1.0000	25.7277	28.2277	51.9294	56.3467	8.2866E 03	2.4927E 05
19500	1.0000	25.7377	28.2377	52.0824	56.3891	8.1261E 03	2.4964E 05

TABLE 35 (CONT.). IDEAL GAS FUNCTIONS FOR AIR 8*

TEMP. (°F)	PARTIT. FUNCT.	$\frac{h^0 - h^0}{RT}$	$-\frac{h^0 - h^0}{RT}$	$\ln \frac{h^0 - h^0}{RT}$	$h^0 - h^0$ - CAL/MOLE	$h^0 - h^0$ - CAL/MOLE	$h^0 - h^0$ - CAL/MOLE	$h^0 - h^0$ - CAL/MOLE	TEMP. (°F)
20000	1.0000	26.4250	29.1750	4.96791	52.9022	57.8762	5.9615E 04	9.9358E 04	20000
22000	1.0000	26.2633	29.3633	4.96791	53.3817	58.3496	6.5576E 04	1.0927E 05	22000
24000	1.0000	27.0808	29.5808	4.96791	53.8160	58.7819	7.1530E 04	1.1923E 05	24000
26000	1.0000	27.2809	29.7809	4.96791	54.2116	59.1796	7.7499E 04	1.2917E 05	26000
28000	1.0000	27.4662	29.9662	4.96791	54.5798	59.5477	8.3461E 04	1.3910E 05	28000
30000	1.0000	27.6366	30.1366	4.96791	54.9226	59.8905	8.9422E 04	1.4904E 05	30000
32000	1.0000	27.8000	30.3000	4.96791	55.2432	60.2111	9.5384E 04	1.5897E 05	32000
34000	1.0000	27.9516	30.4516	4.96791	55.5444	60.5129	1.0135E 05	1.6891E 05	34000
36000	1.0000	28.0944	30.5944	4.96791	55.8283	60.7962	1.0731E 05	1.7884E 05	36000
38000	1.0000	28.2296	30.7296	4.96791	56.0969	61.0648	1.1327E 05	1.8878E 05	38000
40000	1.0000	28.3578	30.8578	4.96791	56.3517	61.3196	1.1923E 05	1.9872E 05	40000
42000	1.0000	28.4798	30.9798	4.96791	56.5941	61.5620	1.2519E 05	2.0865E 05	42000
44000	1.0000	28.5961	31.0761	4.96791	56.8252	61.7931	1.3115E 05	2.1859E 05	44000
46000	1.0000	28.7073	31.2073	4.96791	57.0461	62.0140	1.3711E 05	2.2852E 05	46000
48000	1.0000	28.8137	31.3137	4.96791	57.2575	62.2254	1.4308E 05	2.3846E 05	48000
50000	1.0000	28.9157	31.4157	4.96791	57.4603	62.4282	1.4904E 05	2.4840E 05	50000
60000	1.0000	29.3715	31.8715	4.96791	58.3641	63.3340	1.7884E 05	2.9807E 05	60000
70000	1.0000	29.7549	32.2549	4.96791	59.1319	64.0998	2.0865E 05	3.4775E 05	70000
80000	1.0000	30.0907	32.5907	4.96791	59.7952	64.7631	2.3846E 05	3.9743E 05	80000
90000	1.0000	30.3892	32.8852	4.96791	60.3604	65.3483	2.6827E 05	4.4711E 05	90000
100000	1.0000	30.6426	33.1486	4.96791	60.9030	65.8717	2.9807E 05	4.9679E 05	100000
150000	1.0000	31.6622	34.1622	4.96792	62.9181	67.8860	4.4711E 05	7.4519E 05	150000
200000	1.0000	32.3815	34.8816	4.96828	64.3473	69.3156	5.9622E 05	9.9366E 05	200000
300000	1.0025	33.1976	35.6975	5.02229	66.3664	71.3389	9.1054E 05	1.5067E 06	300000
400000	1.0406	34.1562	36.6669	5.62913	67.8699	73.4991	1.4560E 06	2.2517E 06	400000
500000	1.2284	34.8779	38.6791	7.55374	69.3081	76.8618	2.7833E 06	3.7769E 06	500000
600000	1.7617	35.6829	40.7163	10.00229	70.9077	80.9100	4.8091E 06	6.0014E 06	600000
800000	4.3676	37.3168	43.3651	11.97916	74.1547	86.1330	7.9936E 06	9.5833E 06	800000
1000000	9.4348	38.6494	44.8820	11.95031	76.8028	88.3931	9.60931E 06	1.1590E 07	1000000
1500000	30.6421	40.8611	45.8007	9.85558	81.1560	91.0136	1.1803E 07	1.4783E 07	1500000
2000000	57.1782	42.1841	46.5794	8.73633	83.8267	92.5611	1.3494E 07	1.7469E 07	2000000
3000000	108.2648	43.8361	47.6252	7.52942	87.1097	96.5391	1.6427E 07	2.2580E 07	3000000
4000000	149.6363	44.8790	48.3539	6.90315	89.1020	98.0871	1.9672E 07	2.7621E 07	4000000
5000000	181.9316	45.6323	48.9158	6.52494	90.7699	97.2036	2.2649E 07	3.2642E 07	5000000
6000000	207.3540	46.2189	49.3738	6.26931	91.8445	98.1130	2.5493E 07	3.7616E 07	6000000
8000000	244.3131	47.1021	50.0950	5.94749	93.5996	99.5471	3.1083E 07	4.7580E 07	8000000
10000000	269.6555	47.7586	50.6538	5.75323	94.9043	100.6576	3.7661E 07	5.7532E 07	10000000

TABLE 36. IDEAL GAS FUNCTIONS FOR AR 9+ (ATOMIC WEIGHT 39.9430, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 77 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	$\frac{h^2 - \epsilon^2}{RT}$	TEMP. (°K)
20000	4.5458	2.65592	28.1391	30.7951	5.27776	55.9171	61.1949	6.5812E 04	1.0554E 05	1.1183E 06	20000
22000	4.6142	2.65715	28.3233	31.0495	5.28017	56.4203	61.7005	7.2647E 04	1.1616E 05	1.2412E 06	22000
24000	4.6777	2.65679	28.4923	31.2803	5.27948	56.8797	62.1542	7.9215E 04	1.2671E 05	1.3551E 06	24000
26000	4.7365	2.65534	28.6361	31.4915	5.27660	57.3022	62.5788	8.5525E 04	1.3719E 05	1.4699E 06	26000
28000	4.7910	2.65315	27.0329	31.6860	5.27225	57.6931	62.9853	9.1982E 04	1.4762E 05	1.6154E 06	28000
30000	4.8414	2.65047	29.2158	31.8663	5.26693	58.0567	63.3236	9.8393E 04	1.5801E 05	1.7417E 06	30000
32000	4.8882	2.64749	29.3868	32.0363	5.26100	58.3964	63.6574	1.0476E 05	1.6833E 05	1.8648E 06	32000
34000	4.9316	2.64432	29.5472	32.1915	5.25470	58.7151	63.9848	1.1110E 05	1.7844E 05	1.9943E 06	34000
36000	4.9720	2.64106	29.6982	32.3393	5.24821	59.0153	64.2635	1.1740E 05	1.8894E 05	2.1246E 06	36000
38000	5.0097	2.63776	29.8409	32.4787	5.24167	59.2989	64.5406	1.2367E 05	1.9918E 05	2.2553E 06	38000
40000	5.0448	2.63448	29.9762	32.6106	5.23515	59.5676	64.8027	1.2992E 05	2.0941E 05	2.3827E 06	40000
42000	5.0776	2.63125	30.1046	32.7359	5.22872	59.8229	65.0516	1.3615E 05	2.1961E 05	2.5126E 06	42000
44000	5.1085	2.62808	30.2270	32.8550	5.22242	60.0800	65.2884	1.4234E 05	2.2979E 05	2.6428E 06	44000
46000	5.1371	2.62499	30.3437	32.9687	5.21629	60.2980	65.5162	1.4854E 05	2.3992E 05	2.7737E 06	46000
48000	5.1642	2.62199	30.4554	33.0774	5.21033	60.5198	65.7302	1.5471E 05	2.5010E 05	2.9050E 06	48000
50000	5.1896	2.61909	30.5623	33.1814	5.20456	60.7324	65.9370	1.6087E 05	2.6023E 05	3.0366E 06	50000
60000	5.2972	2.60602	31.0387	33.6447	5.17859	61.6790	66.8575	1.9149E 05	3.1072E 05	3.7887E 06	60000
70000	5.3800	2.59520	31.4395	34.0347	5.15709	62.4756	67.6327	2.2189E 05	3.6100E 05	4.3733E 06	70000
80000	5.4556	2.58626	31.7855	34.3717	5.13933	63.1630	68.3023	2.5217E 05	4.1115E 05	5.0530E 06	80000
90000	5.4987	2.57888	32.0897	34.6685	5.12466	63.7675	68.8921	2.8237E 05	4.6122E 05	5.7391E 06	90000
100000	5.5428	2.57281	32.3410	34.9339	5.11260	64.3067	69.4193	3.1254E 05	5.1124E 05	6.4307E 06	100000
150000	5.6881	2.55740	33.4006	35.9580	5.08197	66.3725	71.4544	4.6422E 05	7.6230E 05	9.9559E 06	150000
200000	5.7823	2.55093	34.1362	36.6951	5.06501	67.8343	72.9193	6.1957E 05	1.0170E 06	1.3547E 07	200000
300000	5.9445	2.54090	35.1779	37.7628	5.13463	69.9043	75.0409	9.4484E 05	1.5410E 06	2.0771E 07	300000
400000	6.1516	2.67797	35.9310	38.6090	5.32157	71.4008	76.7224	1.3338E 06	2.1284E 06	2.8540E 07	400000
500000	6.5944	3.02302	36.5590	39.5820	6.00723	72.6487	78.6559	2.0100E 06	3.0034E 06	3.6324E 07	500000
600000	7.0928	3.73415	37.1682	40.9024	7.42037	73.8594	81.2798	3.2599E 06	4.4522E 06	4.9314E 07	600000
800000	13.6786	5.20211	38.4430	43.6451	10.33745	76.4323	86.7497	6.6802E 06	8.2780E 06	6.1146E 07	800000
1000000	26.5840	5.61764	39.6954	45.3031	11.18323	78.8614	90.0247	9.1761E 06	1.1163E 07	7.8861E 07	1000000
1500000	86.9081	5.09046	41.8835	46.9740	10.11556	83.2295	93.3450	1.2193E 07	1.5173E 07	1.2444E 08	1500000
2000000	158.9542	6.53823	43.2675	47.8057	9.01821	85.9797	96.9379	1.6042E 07	1.8024E 07	1.7194E 08	2000000
3000000	336.8711	3.25843	44.9712	48.8897	7.74662	89.3653	97.1121	2.3240E 07	2.3240E 07	2.6810E 08	3000000
4000000	478.7323	3.55947	46.0419	49.6013	7.07325	91.6528	99.5861	2.0344E 07	2.0344E 07	3.6537E 08	4000000
5000000	592.0501	3.35194	46.8122	50.1641	6.66066	93.0236	99.8844	2.3340E 07	2.3340E 07	4.6512E 08	5000000
6000000	842.5295	3.21717	47.4102	50.6224	6.39311	100.5950	100.5950	2.6370E 07	2.6370E 07	5.6527E 08	6000000
8000000	815.8030	3.03605	48.3078	51.3438	6.03313	95.9955	102.0287	3.2360E 07	3.2360E 07	7.6796E 08	8000000
10000000	908.2249	2.92971	48.9730	51.9027	5.82181	97.3174	103.1392	3.8344E 07	3.8344E 07	9.7317E 08	10000000

TABLE 37. IDEAL GAS FUNCTIONS FOR AN 10+ (ATOMIC WEIGHT 39.9430, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N S_{1/2}. SEE TABLE 78 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{W^0-E^0}{RT}$	$-\frac{F^0-E^0}{RT}$	S^0/N	$\ln W^0-E^0_{VT}$ -- CAL/MOLE N	S^0	F^0-E^0 -- CAL/MOLE	W^0-E^0 -- CAL/MOLE	$-(W^0-E^0)$	TEMP. (°K)
20000	6.3668	2.7667	28.4760	31.2307	5.47398	56.8666	62.0606	6.9734E 04	1.0940E 05	1.1317E 04
22000	6.5251	2.76060	28.7389	31.4995	5.48577	57.1089	62.5947	7.6969E 04	1.2049E 05	1.2564E 04
24000	6.6763	2.76610	29.0093	31.7754	5.49670	57.3867	63.0834	8.4229E 04	1.3192E 05	1.3821E 04
26000	6.8214	2.77133	29.2009	31.9723	5.50709	58.0271	63.5342	9.1510E 04	1.4310E 05	1.5007E 04
28000	6.9613	2.77630	29.4065	32.1928	5.51637	58.6355	63.9525	9.8835E 04	1.5440E 05	1.6362E 04
30000	7.0964	2.78099	29.5982	32.3792	5.52629	59.8165	64.3628	1.0617E 05	1.6579E 05	1.7645E 04
32000	7.2273	2.78536	29.7778	32.5632	5.53437	59.1734	64.7084	1.1353E 05	1.7712E 05	1.8924E 04
34000	7.3543	2.78915	29.9468	32.7362	5.54291	59.5092	65.0321	1.2090E 05	1.8844E 05	2.0232E 04
36000	7.4777	2.79295	30.1063	32.8993	5.55006	59.8263	65.3763	1.2824E 05	1.9980E 05	2.1537E 04
38000	7.5978	2.79613	30.2574	33.0536	5.55638	60.1265	65.6829	1.3563E 05	2.1114E 05	2.2840E 04
40000	7.7146	2.79890	30.4009	33.1998	5.56188	60.4117	65.9735	1.4299E 05	2.2240E 05	2.4165E 04
42000	7.8284	2.80125	30.5375	33.3388	5.56658	60.8831	66.2497	1.5033E 05	2.3340E 05	2.5487E 04
44000	7.9392	2.80320	30.6678	33.4711	5.57053	60.9422	66.5126	1.5764E 05	2.4510E 05	2.6815E 04
46000	8.0473	2.80477	30.7925	33.5973	5.57355	61.1899	66.7634	1.6497E 05	2.5630E 05	2.8147E 04
48000	8.1525	2.80599	30.9119	33.7179	5.57596	61.5271	67.0031	1.7226E 05	2.6765E 05	2.9485E 04
50000	8.2552	2.80686	31.0265	33.8354	5.57770	61.6548	67.2325	1.7953E 05	2.7880E 05	3.0827E 04
60000	8.7312	2.80706	31.5386	34.3654	5.57810	62.6720	68.2501	2.1546E 05	3.3400E 05	3.7603E 04
70000	9.1316	2.80240	31.9708	34.7732	5.56483	63.5312	69.1001	2.5072E 05	3.8902E 05	4.4472E 04
80000	9.5244	2.79514	32.3445	35.1397	5.55440	64.2739	69.8283	2.8538E 05	4.4435E 05	5.1619E 04
90000	9.8565	2.78687	32.6733	35.4602	5.53798	64.9272	70.4652	3.1957E 05	4.9842E 05	5.8434E 04
100000	10.1547	2.77866	32.9665	35.7451	5.52166	65.5098	71.0315	3.5345E 05	5.5217E 05	6.5519E 04
150000	11.3039	2.75389	34.0874	36.8412	5.47243	67.7372	73.2096	5.2279E 05	8.2084E 05	1.0141E 07
200000	12.1608	2.75784	34.9796	37.6375	5.48029	69.3116	76.7919	6.9862E 05	1.0941E 06	1.3843E 07
300000	13.5871	2.79219	36.0042	38.7964	5.54854	71.5463	77.0948	1.0644E 06	1.6644E 06	2.1644E 07
400000	14.8300	2.81400	36.8109	39.6249	5.59188	73.1494	78.7413	1.4419E 06	2.2340E 06	2.9240E 07
500000	15.9175	2.81805	37.4396	40.2576	5.59994	74.3986	79.985	1.8044E 06	2.8000E 06	3.7149E 07
600000	16.8594	2.81139	37.9529	40.7643	5.58669	75.4186	81.0053	2.1597E 06	3.3520E 06	4.5251E 07
700000	17.6784	2.78557	38.7583	41.5439	5.53538	77.0152	82.554	2.8384E 06	4.4283E 06	6.1615E 07
800000	18.3275	2.75718	39.3768	42.1340	5.47897	78.2483	83.7272	3.4918E 06	5.4790E 06	7.8240E 07
900000	19.2239	2.69979	40.4832	43.1830	5.36493	80.4447	85.1117	5.0666E 06	8.0474E 06	1.00000E 08
1000000	20.5638	2.66129	41.2542	43.9155	5.28843	81.9789	87.2674	6.6025E 06	1.0577E 07	1.6394E 08
1500000	23.5872	2.61548	42.3236	44.9391	5.19740	84.1040	89.3014	9.6307E 06	1.5592E 07	2.5231E 08
2000000	26.5686	2.58967	43.0722	45.6619	5.14611	86.5916	90.7377	1.2634E 07	2.0504E 07	3.4237E 08
3000000	28.0178	2.57323	43.6482	46.2216	5.11343	88.7362	91.8496	1.5431E 07	2.5547E 07	4.3348E 08
4000000	28.5271	2.56186	44.1163	46.6781	5.09083	87.6663	92.7572	1.8622E 07	3.0545E 07	5.2608E 08
5000000	29.7252	2.54718	44.8511	47.3983	5.06166	89.1265	94.1882	2.4596E 07	4.0493E 07	7.1301E 08
6000000	29.9703	2.53812	45.4184	47.9565	5.04367	90.2539	95.4976	3.0545E 07	5.0437E 07	9.0254E 08

TABLE 30. IDEAL GAS FUNCTIONS FOR AN 11+ IONIC WEIGHT 39.9420, $R = 1.98717$ CAL/MOLE
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N S. SEE TABLE 79 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIAL FUNCT.	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	$\frac{W-E}{RT}$	TEMP. (°K)
20000	4.0044	2.90882	26.0123	30.5212	4.98543	59.4452	60.4506	5.9945E 04	9.9709E 04	1.1133E 04	1.1133E 04	20000	
22000	4.0092	2.91620	26.2518	30.7680	5.00010	56.1410	61.1411	6.0285E 04	1.0000E 05	1.2351E 04	1.2351E 04	22000	
24000	4.0144	2.92472	26.4711	30.9979	5.01701	56.3769	61.5979	7.2812E 04	1.0504E 05	1.3578E 04	1.3578E 04	24000	
26000	4.0273	2.94056	26.6739	31.2165	5.04856	56.8798	62.0284	7.9594E 04	1.3124E 05	1.4815E 04	1.4815E 04	26000	
28000	4.0419	2.95378	26.8628	31.4206	5.08272	57.3552	62.4379	8.6676E 04	1.4232E 05	1.6059E 04	1.6059E 04	28000	
30000	4.0608	2.97811	26.9399	31.6181	5.12313	57.7072	62.8303	9.4079E 04	1.5360E 05	1.7312E 04	1.7312E 04	30000	
32000	4.0804	2.99126	26.9701	31.8083	5.16914	58.0393	63.2084	1.0182E 05	1.6541E 05	1.8573E 04	1.8573E 04	32000	
34000	4.1125	2.98282	26.9385	31.9923	5.21993	58.3541	63.5741	1.0991E 05	1.7748E 05	1.9840E 04	1.9840E 04	34000	
36000	4.1456	2.96432	26.8564	32.1708	5.27458	58.6540	63.9284	1.1893E 05	1.8980E 05	2.1113E 04	2.1113E 04	36000	
38000	4.1836	2.94328	26.7407	32.3440	5.33211	58.9407	64.2729	1.2711E 05	2.0262E 05	2.2397E 04	2.2397E 04	38000	
40000	4.2263	2.91321	26.7991	32.5123	5.39160	59.2157	64.6073	1.3618E 05	2.1564E 05	2.3686E 04	2.3686E 04	40000	
42000	4.2737	2.94367	26.9322	32.6759	5.45213	59.4803	64.9324	1.4553E 05	2.2899E 05	2.4982E 04	2.4982E 04	42000	
44000	4.3254	2.97425	30.0406	32.8348	5.51290	59.7353	65.2482	1.5513E 05	2.4257E 05	2.6284E 04	2.6284E 04	44000	
46000	4.3814	2.80459	30.1844	32.9881	5.57318	59.9817	65.5549	1.6496E 05	2.5637E 05	2.7592E 04	2.7592E 04	46000	
48000	4.4414	2.83437	30.3045	33.1369	5.63236	60.2201	65.8525	1.7497E 05	2.7035E 05	2.8904E 04	2.8904E 04	48000	
50000	4.5031	2.86333	30.4208	33.2842	5.68971	60.4512	66.1412	1.8514E 05	2.8450E 05	3.0224E 04	3.0224E 04	50000	
52000	4.5703	2.90010	30.9546	33.9447	5.94181	61.5119	67.4537	2.3728E 05	3.5651E 05	3.6907E 04	3.6907E 04	52000	
54000	4.6417	3.08124	31.4228	34.5041	6.12294	62.4424	68.5653	2.9950E 05	4.2861E 05	4.3710E 04	4.3710E 04	54000	
56000	4.7117	3.13941	31.8384	34.9778	6.23852	63.2682	69.5067	3.4011E 05	4.9908E 05	5.2613E 04	5.2613E 04	56000	
58000	4.7938	3.17196	32.2103	35.3822	6.30321	64.0071	70.3103	3.8844E 05	5.6729E 05	5.7606E 04	5.7606E 04	58000	
60000	4.8647	3.18624	32.5453	35.7316	6.33158	64.6730	71.0045	4.3444E 05	6.3314E 05	6.4473E 04	6.4473E 04	60000	
62000	4.9580	3.13865	33.8321	36.9708	6.23701	65.2300	73.4670	4.3748E 05	9.3554E 05	1.0092E 07	1.0092E 07	62000	
64000	5.0794	3.05060	34.7229	37.7735	6.06266	65.0002	75.0822	8.1498E 05	1.2124E 06	1.3088E 07	1.3088E 07	64000	
66000	5.2113	2.91425	35.9320	38.8462	5.79109	71.4028	77.1939	1.1412E 06	1.7373E 06	2.1421E 07	2.1421E 07	66000	
68000	5.3506	2.82785	36.7376	39.5855	5.61940	73.0435	78.6629	1.4529E 06	2.2470E 06	2.9217E 07	2.9217E 07	68000	
70000	5.4986	2.77033	37.3821	40.1524	5.50510	74.2843	79.7894	1.7590E 06	2.7529E 06	3.7142E 07	3.7142E 07	70000	
72000	5.6551	2.72967	37.8834	40.6130	5.42430	75.2805	80.7048	2.0623E 06	3.2544E 06	4.5164E 07	4.5164E 07	72000	
74000	5.8209	2.67630	38.6607	41.3369	5.31825	76.8251	82.1434	2.4644E 06	4.2544E 06	5.4043E 07	5.4043E 07	74000	
76000	6.0000	2.64295	39.2544	41.8970	5.25198	78.0042	83.2562	3.2648E 06	5.2520E 06	7.0004E 07	7.0004E 07	76000	
78000	6.1918	2.59696	40.3157	42.9127	5.16062	80.1140	85.2747	4.7602E 06	7.7409E 06	1.2017E 08	1.2017E 08	78000	
80000	6.3968	2.57335	41.0593	43.6326	5.11368	81.5916	86.7053	6.2530E 06	1.0227E 07	1.6310E 08	1.6310E 08	80000	
82000	6.6151	2.54931	42.0975	44.6448	5.06590	83.4547	88.7204	9.2362E 06	1.5198E 07	2.5494E 08	2.5494E 08	82000	
84000	6.8469	2.53714	42.8291	45.3642	5.04171	85.1084	90.1501	1.2210E 07	2.0167E 07	3.4043E 08	3.4043E 08	84000	
86000	7.0913	2.52978	43.3944	45.9241	5.02709	86.2318	91.2589	1.5204E 07	2.5135E 07	4.3116E 08	4.3116E 08	86000	
88000	7.3478	2.52446	43.8531	46.3800	5.01731	87.1474	92.1447	1.8181E 07	3.0104E 07	5.2288E 08	5.2288E 08	88000	
90000	7.6167	2.51848	44.3304	47.0992	5.00504	88.5889	93.5940	2.1143E 07	4.0040E 07	7.0871E 08	7.0871E 08	90000	
92000	7.8983	2.51446	44.8122	47.6571	4.99785	89.7949	94.7026	3.0105E 07	4.9978E 07	8.9705E 08	8.9705E 08	92000	

TABLE 19. IDEAL GAS FUNCTIONS FOR AM 12. (ATOMIC WEIGHT 39.9420, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE 80 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT} - \ln \frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT} - \ln \frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT} - \ln \frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT} - \ln \frac{W_0 - E_0}{RT}$	$\ln \frac{W_0 - E_0}{RT} - \ln \frac{W_0 - E_0}{RT}$	TEMP. (°K)	
20000	3.5673	27.9005	31.1852	6.52729	55.4429	61.9701	9.0803E 04	1.3055E 05	1.1099E 04	20000
22000	3.8529	28.2120	31.4645	6.43332	56.0619	62.5252	9.4473E 04	1.4219E 05	1.2334E 04	22000
24000	4.1085	28.4938	31.7176	6.40439	56.6218	63.0262	1.0404E 05	1.5375E 05	1.3509E 04	24000
26000	4.3491	28.7508	31.9499	6.37627	57.1326	63.4408	1.1340E 05	1.6526E 05	1.4854E 04	26000
28000	4.5764	28.9870	32.1635	6.31228	57.6020	63.8153	1.2110E 05	1.7674E 05	1.6129E 04	28000
30000	4.7919	29.2055	32.3625	6.27356	58.0341	64.3097	1.2859E 05	1.8821E 05	1.7411E 04	30000
32000	4.9946	29.4037	32.5445	6.23929	58.4389	64.7952	1.3407E 05	1.9964E 05	1.8701E 04	32000
34000	5.1918	29.5986	32.7230	6.20872	58.8172	65.2759	1.4353E 05	2.1110E 05	1.9998E 04	34000
36000	5.3783	29.7787	32.8873	6.18122	59.1713	65.7529	1.5099E 05	2.2252E 05	2.1202E 04	36000
38000	5.5569	29.9446	33.0426	6.15625	59.5048	66.1611	1.5843E 05	2.3394E 05	2.2412E 04	38000
40000	5.7283	3.08650	30.1032	6.13338	59.8200	66.5934	1.6589E 05	2.4534E 05	2.3629E 04	40000
42000	5.8930	3.07586	30.2535	6.11224	60.1187	66.9310	1.7329E 05	2.5677E 05	2.4839E 04	42000
44000	6.0516	3.06595	30.3964	6.09255	60.4026	67.2471	1.8064E 05	2.6821E 05	2.6077E 04	44000
46000	6.2045	3.05665	30.5325	6.07407	60.6730	67.5471	1.8800E 05	2.7964E 05	2.7307E 04	46000
48000	6.3521	3.04787	30.6624	6.05662	60.9312	67.8312	1.9533E 05	2.9107E 05	2.8547E 04	48000
50000	6.4945	3.03953	30.7866	6.04005	61.1781	68.1008	2.0264E 05	3.0200E 05	3.0509E 04	50000
60000	7.1419	3.00264	31.3374	5.94674	62.2726	68.2394	2.3477E 05	3.5800E 05	3.7544E 04	60000
70000	7.6986	2.97113	31.7979	5.90414	63.1876	69.0917	2.7419E 05	4.1329E 05	4.4231E 04	70000
80000	8.1523	2.94325	32.1927	5.84873	63.9723	69.8210	3.0892E 05	4.6790E 05	5.1178E 04	80000
90000	8.6092	2.91820	32.5379	5.79896	64.6583	70.4572	3.4304E 05	5.2191E 05	5.8192E 04	90000
100000	8.9863	2.89535	32.8442	5.75394	65.2649	71.0208	3.7668E 05	5.7539E 05	6.5267E 04	100000
150000	10.3651	2.80914	34.0006	5.58223	67.5848	73.1471	5.3926E 05	8.3733E 05	1.8195E 07	150000
200000	11.2354	2.75231	34.8004	5.46930	69.1342	74.6235	6.9643E 05	1.0939E 06	2.3031E 07	200000
300000	12.2873	2.68356	35.9020	5.33269	71.3431	76.6758	1.0037E 06	1.5990E 06	3.1403E 07	300000
400000	12.8557	2.64395	36.6401	5.25397	72.8656	78.1195	1.3067E 06	2.1014E 06	4.2914E 07	400000
500000	13.2374	2.61831	37.2551	5.20302	74.0321	79.2351	1.6079E 06	2.6013E 06	5.7014E 07	500000
600000	13.5034	2.60039	37.7308	5.18741	74.9774	80.1448	1.9081E 06	3.1004E 06	7.4964E 07	600000
800000	13.8506	2.57702	38.4754	5.12097	76.4570	81.5780	2.5070E 06	4.0968E 06	1.1464E 08	800000
1000000	14.0871	2.56247	39.0488	5.09204	77.5964	82.6885	3.1049E 06	5.0920E 06	1.4759E 08	1000000
1500000	14.3658	2.54241	40.0835	5.05219	79.6325	84.7047	4.5979E 06	7.5783E 06	2.1948E 08	1500000
2000000	14.5197	2.53210	40.8133	5.03170	81.1028	86.1345	6.0891E 06	1.0063E 07	2.9221E 08	2000000
3000000	14.6766	2.52150	41.8377	5.01063	83.1385	88.1494	9.0710E 06	1.5032E 07	4.4964E 08	3000000
4000000	14.7527	2.51627	42.5624	5.00025	85.5787	90.5787	1.2053E 07	2.0821E 07	6.3831E 08	4000000
5000000	14.8044	2.51305	43.1238	4.99385	88.4935	93.6073	1.5033E 07	2.6948E 07	8.2841E 08	5000000
6000000	14.8367	2.51090	43.5815	4.98957	91.5931	96.6036	1.8014E 07	3.3937E 07	1.0962E 09	6000000
8000000	14.8772	2.50819	44.3034	4.98419	98.0382	93.0224	2.3970E 07	4.9874E 07	1.4931E 09	8000000
10000000	14.9016	2.50656	44.8629	4.98096	94.1500	94.1509	2.9930E 07	6.4910E 07	1.9150E 09	10000000

TABLE 40. IDEAL GAS FUNCTIONS FOR AN 13° (ATOMIC WEIGHT 39.9410, R = 1.98717 CAL/MOLE)
BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N=54. SEE TABLE 81 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNC.	$\frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	$\ln \frac{U^0 - E_0^0}{RT}$	TEMP. (°K)
20000	2.7834	2.95889	27.4444	30.6074	5.87980	54.9422	40.8220	7.7853E 04	1.1740E 05	1.0968E 04	20000
22000	2.9036	2.96301	27.9708	30.8938	5.88799	55.5031	41.3911	8.5818E 04	1.2211E 05	1.2211E 04	22000
24000	3.0213	2.96730	28.1824	31.1499	5.89459	56.0154	41.9000	9.3538E 04	1.2644E 05	1.3444E 04	24000
26000	3.1413	2.97574	28.4254	31.3812	5.90354	56.4860	42.3594	1.0105E 05	1.3271E 05	1.4468E 04	26000
28000	3.2653	2.98772	28.6442	31.5919	5.91571	56.9207	42.7783	1.0837E 05	1.4001E 05	1.5938E 04	28000
30000	3.3492	2.93824	28.8472	31.7855	5.93875	57.3242	43.1630	1.1555E 05	1.7516E 05	1.7197E 04	30000
32000	3.4441	2.92799	29.0265	31.9645	5.91839	57.7004	43.5188	1.2240E 05	1.8619E 05	1.8464E 04	32000
34000	3.5335	2.91748	29.2137	32.1312	5.94751	58.0525	43.8500	1.2955E 05	1.9712E 05	1.9738E 04	34000
36000	3.6178	2.90708	29.3802	32.2873	5.97684	58.3839	44.1602	1.3643E 05	2.0797E 05	2.1018E 04	36000
38000	3.6973	2.89705	29.5371	32.4362	5.97562	58.6951	44.4520	1.4325E 05	2.1876E 05	2.2304E 04	38000
40000	3.7725	2.88759	29.6855	32.5731	5.97813	58.9899	44.7280	1.5004E 05	2.2953E 05	2.3594E 04	40000
42000	3.8436	2.87804	29.8261	32.7058	5.97077	59.2695	44.9902	1.5681E 05	2.4027E 05	2.4893E 04	42000
44000	3.9113	2.87004	29.9599	32.8308	5.96504	59.5352	45.2403	1.6359E 05	2.5102E 05	2.6195E 04	44000
46000	3.9757	2.86393	30.0873	32.9513	5.96109	59.7885	45.4796	1.7038E 05	2.6179E 05	2.7503E 04	46000
48000	4.0372	2.85785	30.2091	33.0669	5.95903	60.0305	45.7095	1.7721E 05	2.7259E 05	2.8815E 04	48000
50000	4.0962	2.85276	30.3254	33.1784	5.94890	60.2621	45.9310	1.8409E 05	2.8344E 05	3.0131E 04	50000
60000	4.3625	2.84187	30.8444	33.6863	5.64727	61.2930	46.9403	2.1981E 05	3.6776E 05	3.6776E 04	60000
70000	4.6312	2.85297	31.2831	34.1361	5.66932	62.1647	47.8340	2.5775E 05	3.3689E 05	4.3515E 04	70000
80000	4.8313	2.84040	31.6457	34.5445	5.72442	62.9250	48.4496	2.9600E 05	4.5797E 05	5.0340E 04	80000
90000	5.0439	2.91971	32.0072	34.9269	5.80195	63.6036	48.9305	3.6333E 05	5.2218E 05	5.7273E 04	90000
100000	5.3050	2.85483	32.3171	35.2819	5.89160	64.2194	49.3110	3.9064E 05	5.4916E 05	6.4219E 04	100000
150000	6.4911	3.16970	33.5829	36.7486	6.35051	64.8940	49.6940	4.3150E 05	6.4958E 05	7.1004E 04	150000
200000	8.3272	3.32263	34.5003	37.8229	6.40281	68.5577	52.1603	9.2305E 05	1.3203E 06	1.3712E 07	200000
300000	11.8207	3.40669	36.8491	39.2738	6.76586	71.2778	58.0434	1.4536E 06	2.0297E 06	2.0000E 07	300000
400000	15.3623	3.37718	38.8461	40.2233	6.71102	73.2193	59.9303	1.8899E 06	2.6844E 06	2.9288E 07	400000
500000	18.5699	3.31795	40.9115	41.9115	6.59331	74.7047	61.2900	2.3031E 06	3.2967E 06	3.7352E 07	500000
600000	21.433C	3.25366	42.1928	43.4465	6.48537	75.8955	62.5610	2.6870E 06	3.8792E 06	4.5337E 07	600000
800000	26.1921	3.13073	44.2513	45.2513	6.23717	77.7231	63.9402	3.4000E 06	4.9697E 06	6.2178E 07	800000
1000000	29.8000	3.04847	46.4028	47.4028	6.05782	79.0947	65.1525	4.0707E 06	6.0578E 06	7.9695E 07	1000000
1500000	36.2084	2.90032	51.0079	53.9082	5.76342	81.4894	67.2529	5.6644E 06	8.8451E 06	1.2223E 08	1500000
2000000	40.1084	2.81354	54.8294	58.6429	5.59100	83.1219	68.7129	7.2077E 06	1.1182E 07	1.6424E 08	2000000
3000000	46.4274	2.71500	62.9498	65.4678	5.40112	85.3484	70.7495	1.0242E 07	1.6203E 07	2.5469E 08	3000000
4000000	47.1536	2.64687	67.7241	69.7241	5.29952	86.8870	72.1865	1.3249E 07	2.1198E 07	3.4759E 08	4000000
5000000	48.7634	2.63312	71.3155	73.3155	5.23642	88.0422	73.2587	1.6244E 07	2.6183E 07	4.4831E 08	5000000
6000000	49.8790	2.61350	74.7939	76.7939	5.19344	89.0129	74.2064	1.9238E 07	3.1161E 07	5.5408E 08	6000000
8000000	51.3218	2.50597	84.5416	84.5416	5.13875	90.9968	75.4375	2.5213E 07	4.1106E 07	7.2399E 08	8000000
10000000	52.2495	2.56918	88.1147	88.1147	5.10559	91.6416	76.7470	3.1182E 07	5.1054E 07	9.1642E 08	10000000

[illegible]

TABLE 42. IDEAL GAS FUNCTIONS FOR AR 15+ IONIC WEIGHT 39.9400, $R = 1.98717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 6$. SEE TABLE 83 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - \epsilon_0}{RT}$	$\ln \frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\ln \frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\ln \frac{h^2 - \epsilon_0}{RT}$	$\frac{h^2 - \epsilon_0}{RT}$	$\ln \frac{h^2 - \epsilon_0}{RT}$	TEMP. (°K)
20000	2.0000	2.5000	4.90791	54.2853	59.2533	5.9615E 04	9.9350E 04	1.0857E 04	1.0857E 04	20000
22000	2.0000	2.5000	4.96792	54.7588	59.7267	6.5577E 04	1.0927E 05	1.2047E 04	1.2047E 04	22000
24000	2.0000	2.5000	5.02793	55.2323	60.1992	7.1533E 04	1.1000E 05	1.3246E 04	1.3246E 04	24000
26000	2.0000	2.5000	5.08794	55.7057	60.6716	7.7500E 04	1.1073E 05	1.4453E 04	1.4453E 04	26000
28000	2.0000	2.5000	5.14795	56.1791	61.1440	8.3463E 04	1.1146E 05	1.5660E 04	1.5660E 04	28000
30000	2.0000	2.5000	5.20796	56.6525	61.6164	8.9426E 04	1.1219E 05	1.6867E 04	1.6867E 04	30000
32000	2.0000	2.5000	5.26797	57.1259	62.0888	9.5389E 04	1.1292E 05	1.8074E 04	1.8074E 04	32000
34000	2.0000	2.5000	5.32798	57.5993	62.5612	1.0141E 05	1.1365E 05	1.9281E 04	1.9281E 04	34000
36000	2.0000	2.5000	5.38799	58.0727	63.0336	1.0690E 05	1.1438E 05	2.0488E 04	2.0488E 04	36000
38000	2.0000	2.5000	5.44799	58.5461	63.5060	1.1239E 05	1.1511E 05	2.1695E 04	2.1695E 04	38000
40000	2.0000	2.5000	5.50799	59.0195	63.9784	1.1790E 05	1.1584E 05	2.2902E 04	2.2902E 04	40000
42000	2.0000	2.5000	5.56799	59.4929	64.4508	1.2341E 05	1.1657E 05	2.4109E 04	2.4109E 04	42000
44000	2.0000	2.5000	5.62799	59.9663	64.9232	1.2892E 05	1.1730E 05	2.5316E 04	2.5316E 04	44000
46000	2.0000	2.5000	5.68799	60.4397	65.3956	1.3443E 05	1.1803E 05	2.6523E 04	2.6523E 04	46000
48000	2.0000	2.5000	5.74799	60.9131	65.8680	1.3994E 05	1.1876E 05	2.7730E 04	2.7730E 04	48000
50000	2.0000	2.5000	5.80799	61.3865	66.3404	1.4545E 05	1.1949E 05	2.8937E 04	2.8937E 04	50000
52000	2.0000	2.5000	5.86799	61.8599	66.8128	1.5096E 05	1.2022E 05	3.0144E 04	3.0144E 04	52000
54000	2.0000	2.5000	5.92799	62.3333	67.2852	1.5647E 05	1.2095E 05	3.1351E 04	3.1351E 04	54000
56000	2.0000	2.5000	5.98799	62.8067	67.7576	1.6198E 05	1.2168E 05	3.2558E 04	3.2558E 04	56000
58000	2.0000	2.5000	6.04799	63.2801	68.2300	1.6749E 05	1.2241E 05	3.3765E 04	3.3765E 04	58000
60000	2.0000	2.5000	6.10799	63.7535	68.7024	1.7300E 05	1.2314E 05	3.4972E 04	3.4972E 04	60000
62000	2.0000	2.5000	6.16799	64.2269	69.1748	1.7851E 05	1.2387E 05	3.6179E 04	3.6179E 04	62000
64000	2.0000	2.5000	6.22799	64.7003	69.6472	1.8402E 05	1.2460E 05	3.7386E 04	3.7386E 04	64000
66000	2.0000	2.5000	6.28799	65.1737	70.1196	1.8953E 05	1.2533E 05	3.8593E 04	3.8593E 04	66000
68000	2.0000	2.5000	6.34799	65.6471	70.5920	1.9504E 05	1.2606E 05	3.9800E 04	3.9800E 04	68000
70000	2.0000	2.5000	6.40799	66.1205	71.0644	2.0055E 05	1.2679E 05	4.1007E 04	4.1007E 04	70000
72000	2.0000	2.5000	6.46799	66.5939	71.5368	2.0606E 05	1.2752E 05	4.2214E 04	4.2214E 04	72000
74000	2.0000	2.5000	6.52799	67.0673	72.0092	2.1157E 05	1.2825E 05	4.3421E 04	4.3421E 04	74000
76000	2.0000	2.5000	6.58799	67.5407	72.4816	2.1708E 05	1.2898E 05	4.4628E 04	4.4628E 04	76000
78000	2.0000	2.5000	6.64799	68.0141	72.9540	2.2259E 05	1.2971E 05	4.5835E 04	4.5835E 04	78000
80000	2.0000	2.5000	6.70799	68.4875	73.4264	2.2810E 05	1.3044E 05	4.7042E 04	4.7042E 04	80000
82000	2.0000	2.5000	6.76799	68.9609	73.8988	2.3361E 05	1.3117E 05	4.8249E 04	4.8249E 04	82000
84000	2.0000	2.5000	6.82799	69.4343	74.3712	2.3912E 05	1.3190E 05	4.9456E 04	4.9456E 04	84000
86000	2.0000	2.5000	6.88799	69.9077	74.8436	2.4463E 05	1.3263E 05	5.0663E 04	5.0663E 04	86000
88000	2.0000	2.5000	6.94799	70.3811	75.3160	2.5014E 05	1.3336E 05	5.1870E 04	5.1870E 04	88000
90000	2.0000	2.5000	7.00799	70.8545	75.7884	2.5565E 05	1.3409E 05	5.3077E 04	5.3077E 04	90000
92000	2.0000	2.5000	7.06799	71.3279	76.2608	2.6116E 05	1.3482E 05	5.4284E 04	5.4284E 04	92000
94000	2.0000	2.5000	7.12799	71.8013	76.7332	2.6667E 05	1.3555E 05	5.5491E 04	5.5491E 04	94000
96000	2.0000	2.5000	7.18799	72.2747	77.2056	2.7218E 05	1.3628E 05	5.6698E 04	5.6698E 04	96000
98000	2.0000	2.5000	7.24799	72.7481	77.6780	2.7769E 05	1.3701E 05	5.7905E 04	5.7905E 04	98000
100000	2.0000	2.5000	7.30799	73.2215	78.1504	2.8320E 05	1.3774E 05	5.9112E 04	5.9112E 04	100000

TABLE 43. IDEAL GAS FUNCTIONS FOR $\mu = 10^{-6}$ (ATOMIC WEIGHT 39.9400, $R = 1.98717$ CAL/MOLE) BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$. SEE TABLE 44 FOR LIST OF STATES USED.

[illegible]

TABLE 44. IDEAL GAS FUNCTIONS FOR AR 17. (ATOMIC WEIGHT 39.9390, R = 1.90717 CAL/MOLE)
 BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS N ≤ 4. SEE TABLE B5 FOR LIST OF STATES USED.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT} - \frac{h^2 - \epsilon}{RT}$	$\frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT} - \frac{h^2 - \epsilon}{RT}$	$\ln \frac{h^2 - \epsilon}{RT}$	TEMP. (°K)
20000	2.0000	27.3179	29.6179	4.96791	54.2833	59.2532	5.96156	9.93586	20000
22000	2.0000	27.5562	30.0562	4.96791	54.7568	59.7267	4.95762	9.93586	22000
24000	2.0000	27.7737	30.2737	4.96791	55.1910	60.1509	4.95368	9.93586	24000
26000	2.0000	27.9739	30.4739	4.96791	55.5807	60.5564	4.94974	9.93586	26000
28000	2.0000	28.1591	30.6591	4.96791	55.9568	60.9247	4.94580	9.93586	28000
30000	2.0000	28.3316	30.8316	4.96791	56.3296	61.2875	4.94186	9.93586	30000
32000	2.0000	28.4930	30.9930	4.96791	56.6922	61.6501	4.93792	9.93586	32000
34000	2.0000	28.6445	31.1445	4.96791	57.0548	62.0127	4.93398	9.93586	34000
36000	2.0000	28.7874	31.2874	4.96791	57.4173	62.3752	4.93004	9.93586	36000
38000	2.0000	28.9226	31.4226	4.96791	57.7799	62.7378	4.92610	9.93586	38000
40000	2.0000	29.0508	31.5508	4.96791	58.1424	63.1003	4.92216	9.93586	40000
42000	2.0000	29.1728	31.6728	4.96791	58.5049	63.4629	4.91822	9.93586	42000
44000	2.0000	29.2891	31.7891	4.96791	58.8674	63.8254	4.91428	9.93586	44000
46000	2.0000	29.4002	31.9002	4.96791	59.2299	64.1879	4.91034	9.93586	46000
48000	2.0000	29.5064	32.0064	4.96791	59.5924	64.5504	4.90640	9.93586	48000
50000	2.0000	29.6087	32.1087	4.96791	59.9549	64.9129	4.90246	9.93586	50000
60000	2.0000	30.0645	32.5645	4.96791	60.7173	65.6753	4.89852	9.93586	60000
70000	2.0000	30.4498	32.9498	4.96791	61.4798	66.4378	4.89458	9.93586	70000
80000	2.0000	30.7837	33.2837	4.96791	62.2423	67.2003	4.89064	9.93586	80000
90000	2.0000	31.0781	33.5781	4.96791	63.0048	67.9628	4.88670	9.93586	90000
100000	2.0000	31.3415	33.8415	4.96791	63.7673	68.7253	4.88276	9.93586	100000
120000	2.0000	32.3552	34.8552	4.96791	65.2808	70.2388	4.87882	9.93586	120000
140000	2.0000	33.1744	35.6744	4.96791	66.7943	71.7523	4.87488	9.93586	140000
160000	2.0000	34.0081	36.5081	4.96791	68.3078	73.2658	4.87094	9.93586	160000
180000	2.0000	34.8673	37.3673	4.96791	69.8213	74.7793	4.86700	9.93586	180000
200000	2.0000	35.7451	38.2451	4.96791	71.3348	76.2928	4.86306	9.93586	200000
220000	2.0000	36.6299	39.1299	4.96791	72.8483	77.8063	4.85912	9.93586	220000
240000	2.0000	37.5401	39.9401	4.96791	74.3618	79.3198	4.85518	9.93586	240000
260000	2.0000	38.4890	40.8890	4.96791	75.8753	80.8333	4.85124	9.93586	260000
280000	2.0000	39.4645	41.8645	4.96791	77.3888	82.3468	4.84730	9.93586	280000
300000	2.0000	40.4645	42.8645	4.96791	78.9023	83.8603	4.84336	9.93586	300000
320000	2.0000	41.4890	43.8890	4.96791	80.4158	85.3738	4.83942	9.93586	320000
340000	2.0000	42.5371	44.9371	4.96791	81.9293	86.8873	4.83548	9.93586	340000
360000	2.0000	43.6082	46.0082	4.96791	83.4428	88.4008	4.83154	9.93586	360000
380000	2.0000	44.7023	47.1023	4.96791	84.9563	89.9143	4.82760	9.93586	380000
400000	2.0000	45.8198	48.2198	4.96791	86.4698	91.4278	4.82366	9.93586	400000
420000	2.0000	46.9609	49.3609	4.96791	87.9833	92.9413	4.81972	9.93586	420000
440000	2.0000	48.1254	50.5254	4.96791	89.4968	94.4548	4.81578	9.93586	440000
460000	2.0000	49.3139	51.7139	4.96791	91.0103	95.9683	4.81184	9.93586	460000
480000	2.0000	50.5264	52.9264	4.96791	92.5238	97.4818	4.80790	9.93586	480000
500000	2.0000	51.7629	54.1629	4.96791	94.0373	98.9953	4.80396	9.93586	500000
600000	2.0000	58.1424	60.5424	4.96791	100.4168	105.3748	4.79902	9.93586	600000
700000	2.0000	65.2808	67.6808	4.96791	106.7963	111.7543	4.79408	9.93586	700000
800000	2.0000	73.2658	75.6658	4.96791	113.1758	118.1338	4.78914	9.93586	800000
900000	2.0000	82.0129	84.4129	4.96791	119.5553	124.5133	4.78420	9.93586	900000
1000000	2.0000	91.5504	93.9474	4.96791	125.9348	130.8928	4.77926	9.93586	1000000

TABLE 49. IDEAL GAS FUNCTIONS FOR AR 10+ (ATOMIC WEIGHT 39.9505, $R = 1.90717$ CAL/MOLE)

BASED ON ELECTRONIC STATES WITH PRINCIPAL QUANTUM NUMBERS $n \leq 4$.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{U^0 - U}{RT}$	\ln	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} - \frac{U^0 - U}{RT}$	$\ln^0 - \frac{U^0 - U}{RT} -$
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TABLE 3. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O-

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)									
	(CM-1)	WT.	1200	1600	2000	2400	2800	3200	3600	4000	4400	
$2s^2 2p^4 \text{ } ^3P^o_2$	0	6	7.30E-01	7.21E-01	7.11E-01	7.03E-01	6.96E-01	6.90E-01	6.84E-01	6.87E-01		
	215	0.0353	2.82E-01	2.79E-01	2.69E-01	2.97E-01	3.02E-01	3.09E-01	3.11E-01	3.13E-01		
TEMPERATURE (DEG K)												
LEVEL			5000	6000	6400	6800	7200	7600	8000	8400	8800	9200
(CM-1)	0	6.09E-01	6.84E-01	6.83E-01	6.81E-01	6.80E-01	6.79E-01	6.79E-01	6.78E-01	6.77E-01	6.77E-01	6.76E-01
	205	3.15E-01	3.16E-01	3.17E-01	3.18E-01	3.19E-01	3.20E-01	3.21E-01	3.22E-01	3.23E-01	3.23E-01	3.24E-01
TEMPERATURE (DEG K)												
LEVEL			10000	12000	13000	14000	15000	16000	17000	18000	19000	20000
(CM-1)	0	6.76E-01	6.76E-01	6.74E-01	6.74E-01	6.73E-01	6.73E-01	6.72E-01	6.72E-01	6.72E-01	6.71E-01	6.71E-01
	205	3.24E-01	3.25E-01	3.26E-01	3.26E-01	3.27E-01	3.27E-01	3.28E-01	3.28E-01	3.29E-01	3.29E-01	3.29E-01
TEMPERATURE (DEG K)												
LEVEL			24000	26000	30000	34000	40000	44000	48000	0	0	0
(CM-1)	0	6.70E-01	6.70E-01	6.70E-01	6.69E-01	6.69E-01	6.69E-01	6.69E-01	6.69E-01	0.	0.	0.
	205	3.30E-01	3.30E-01	3.30E-01	3.31E-01	3.31E-01	3.31E-01	3.31E-01	3.31E-01	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM BERRY ET AL. (1965)

TABLE 47. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C

STATE	LEVEL (cm ⁻¹)	STAT. WT.	TEMPERATURE (DEG K)									
			1200	1600	2000	2400	2800	3200	3600	4000	4400	4800
2s ² 2p ²	0	1	1.15E-01	1.15E-01	1.15E-01	1.15E-01	1.15E-01	1.15E-01	1.15E-01	1.15E-01	1.15E-01	1.15E-01
	16	3	3.79E-01	3.79E-01	3.79E-01	3.79E-01	3.79E-01	3.79E-01	3.79E-01	3.79E-01	3.79E-01	3.79E-01
	43	5	5.46E-01	5.46E-01	5.46E-01	5.46E-01	5.46E-01	5.46E-01	5.46E-01	5.46E-01	5.46E-01	5.46E-01
	101.94	5	2.03E-06	5.96E-05	3.71E-04	1.27E-03	3.79E-03	5.72E-03	9.47E-03	1.44E-02	1.94E-02	2.43E-02
	216.66	5	6.15E-13	4.01E-10	1.96E-08	2.51E-07	1.66E-06	6.64E-06	1.95E-05	6.60E-05	9.27E-05	1.26E-04
2s 2p ³	337.75	5	1.56E-15	3.01E-14	1.64E-11	9.30E-10	1.67E-09	1.45E-07	1.77E-07	2.97E-06	6.90E-06	1.30E-05
	64.091	15	7.31E-34	1.60E-25	1.61E-20	3.49E-17	6.06E-15	5.13E-13	2.25E-11	1.62E-10	1.34E-09	1.02E-08
	79.256	9	0.	4.10E-34	3.14E-24	2.94E-20	1.63E-17	2.69E-15	8.60E-14	1.79E-12	2.02E-11	2.20E-11
	109.001	3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	178.770	5	0.	3.40E-35	1.49E-31	1.06E-26	6.00E-23	4.32E-20	5.71E-18	2.64E-16	6.92E-15	1.50E-14
2p ⁴	119.070	3	0.	0.	1.20E-36	2.00E-32	5.97E-29	3.31E-24	5.21E-22	6.23E-20	3.12E-18	4.90E-17
	70.424	60	0.	0.	0.	0.	0.	3.14E-30	9.23E-27	3.04E-24	4.96E-22	7.80E-21
	9.4933	12	0.	0.	0.	0.	0.	3.89E-36	2.10E-30	1.15E-25	2.01E-23	3.40E-21
	60.046	36	0.	0.	0.	0.	0.	5.00E-37	4.27E-30	5.00E-26	2.17E-27	3.40E-25
	82.950	60	0.	1.23E-32	4.32E-26	1.00E-21	1.31E-19	2.04E-16	1.87E-14	5.29E-13	6.10E-12	1.20E-11
2s 2p ² (P)	0	64	2.09E-36	3.42E-27	4.78E-22	2.04E-18	1.12E-15	9.79E-14	3.17E-12	5.12E-11	4.97E-10	4.61E-09
	70.424	60	0.	1.61E-30	2.14E-24	2.50E-20	2.11E-17	3.26E-15	1.43E-13	3.72E-12	4.61E-11	5.61E-11
	70.114	12	0.	4.01E-31	5.09E-25	5.07E-21	4.01E-18	2.27E-16	3.09E-14	6.13E-13	1.04E-11	1.60E-11
	80.046	36	0.	1.00E-31	2.23E-25	3.09E-21	3.64E-18	4.53E-16	3.09E-14	9.29E-13	1.20E-11	1.90E-11
	82.950	60	0.	1.23E-32	4.32E-26	1.00E-21	1.31E-19	2.04E-16	1.87E-14	5.29E-13	6.10E-12	1.20E-11
2s 2p ² (D)	0	64	1.90E-32	3.63E-24	5.63E-20	1.20E-16	1.70E-13	3.72E-10	2.64E-08	7.60E-07	1.69E-05	3.60E-05
	14.3018	24	0.	0.	0.	1.70E-30	3.50E-26	6.00E-23	1.90E-20	2.61E-18	6.07E-17	1.40E-16
	13.0000	72	0.	0.	0.	2.32E-32	1.03E-27	3.15E-24	1.61E-21	2.37E-19	1.40E-17	2.40E-16
	13.0000	120	0.	0.	0.	5.02E-34	4.71E-29	2.26E-25	1.64E-22	3.10E-20	2.37E-18	3.47E-16
	13.0150	24	0.	0.	0.	9.54E-36	1.10E-30	6.91E-27	6.19E-24	1.43E-21	1.21E-19	1.21E-19
2s 2p ² (F)	0	20	0.	0.	0.	2.64E-36	3.59E-31	2.53E-27	2.40E-24	6.13E-22	3.50E-20	5.50E-19
	14.0000	60	0.	0.	0.	1.20E-37	2.99E-32	3.26E-28	4.54E-25	1.40E-22	1.60E-20	2.40E-19
	19.0931	100	0.	0.	0.	0.	4.07E-34	9.50E-30	2.07E-26	9.71E-24	1.40E-21	2.40E-20
	19.5000	320	0.	0.	0.	0.	1.90E-34	5.93E-30	1.34E-26	7.37E-24	1.20E-21	2.40E-20
	22.9125	100	0.	0.	0.	0.	0.	1.42E-35	1.39E-31	2.16E-28	6.60E-26	1.20E-25
2p ³ (P)	0	192	0.	0.	0.	0.	0.	2.62E-37	4.54E-33	1.60E-29	5.94E-27	1.40E-26
	21.0923	36	0.	0.	0.	0.	4.67E-38	2.57E-33	1.25E-29	1.11E-26	2.40E-24	4.40E-23
	21.0760	64	0.	0.	0.	0.	0.	7.90E-38	6.00E-31	7.73E-28	2.67E-25	4.40E-24
	23.1926	72	0.	0.	0.	0.	0.	0.	0.	1.44E-33	1.47E-30	1.47E-28
	26.7799	120	0.	0.	0.	0.	0.	0.	0.	1.01E-34	1.57E-31	1.57E-29
2p ³ (D)	0	192	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	21.7217	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	23.0000	320	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	26.1276	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	31.2432	192	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SURLEVELS
NONSTABLE ENERGY LEVELS FROM MOORE (1949) AND NYHAGEN (1954,1955)

TABLE 47 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	4000	5200	5400	6000	6400	6800	7200	7600	8000	8400
0	1.07E-01	1.00E-01	1.00E-01	1.07E-01	1.04E-01	1.05E-01	1.04E-01	1.03E-01	1.02E-01	1.01E-01
16	3.24E-01	3.24E-01	3.24E-01	3.19E-01	3.14E-01	3.13E-01	3.11E-01	3.08E-01	3.06E-01	3.04E-01
43	5.39E-01	5.39E-01	5.32E-01	5.28E-01	5.24E-01	5.19E-01	5.15E-01	5.11E-01	5.07E-01	5.03E-01
10194	2.51E-02	2.33E-02	2.33E-02	2.33E-02	2.33E-02	2.33E-02	2.33E-02	2.33E-02	2.33E-02	2.33E-02
21648	1.64E-04	2.71E-04	4.13E-04	5.94E-04	8.14E-04	1.07E-03	1.37E-03	1.71E-03	2.06E-03	2.42E-03
33735	2.22E-09	4.79E-09	9.25E-09	1.64E-08	2.77E-08	4.17E-08	6.14E-08	8.68E-08	1.18E-07	1.57E-07
64091	7.43E-09	3.29E-08	1.14E-07	3.30E-07	8.77E-07	2.14E-06	5.31E-06	1.31E-05	3.06E-05	6.83E-05
73256	1.57E-10	8.83E-10	3.88E-09	1.68E-08	6.20E-08	1.95E-07	6.25E-07	2.02E-06	6.58E-06	2.08E-05
102891	5.32E-15	6.29E-14	5.08E-14	3.07E-12	1.97E-12	1.26E-11	8.05E-11	4.95E-10	3.04E-09	1.85E-08
91878	9.90E-16	9.30E-15	6.44E-14	3.62E-11	1.47E-10	5.31E-10	1.67E-09	4.62E-09	1.14E-08	2.65E-08
119478	8.12E-17	1.20E-15	1.34E-14	1.05E-13	6.27E-13	3.03E-12	1.23E-11	4.31E-11	1.33E-10	3.40E-10
150000	2.92E-20	5.21E-19	1.77E-17	2.29E-16	2.19E-15	1.95E-14	1.68E-14	1.31E-13	1.07E-12	8.34E-12
153000	1.40E-21	5.60E-20	1.24E-18	1.07E-17	1.94E-16	1.59E-15	1.01E-14	5.73E-14	2.33E-13	9.03E-12
181000	2.99E-25	1.93E-23	6.04E-22	1.51E-20	2.95E-19	2.65E-18	2.04E-17	1.35E-16	7.49E-16	3.40E-15
60776	1.61E-06	6.47E-06	2.13E-05	5.99E-07	1.64E-06	3.27E-06	6.53E-06	1.23E-05	2.20E-05	3.60E-05
69722	3.30E-09	1.63E-08	6.43E-08	2.10E-07	5.93E-07	1.40E-06	3.33E-06	6.87E-06	1.32E-05	2.37E-05
78426	4.07E-10	2.43E-09	1.14E-08	1.40E-07	3.91E-07	9.75E-07	2.20E-06	4.59E-06	8.91E-06	1.63E-05
78104	8.70E-11	5.24E-10	2.44E-09	9.22E-09	2.95E-08	8.23E-08	2.05E-07	4.63E-07	9.59E-07	1.84E-06
80866	1.17E-10	7.40E-10	3.67E-09	1.45E-08	6.84E-08	1.40E-07	3.59E-07	9.33E-07	1.70E-06	3.52E-06
81559	7.94E-11	5.44E-10	2.64E-09	1.10E-08	4.13E-08	1.24E-07	3.30E-07	7.89E-07	1.73E-06	3.52E-06
94400	1.07E-10	7.33E-10	3.07E-09	1.40E-08	5.59E-08	1.40E-07	4.40E-07	1.07E-06	2.34E-06	4.80E-06
110000	2.00E-15	2.90E-14	2.94E-13	2.13E-12	1.20E-11	5.51E-11	2.14E-10	7.10E-10	2.13E-09	5.71E-09
125000	4.20E-16	7.44E-15	8.71E-14	7.37E-13	4.74E-12	2.64E-11	1.04E-10	3.92E-10	1.27E-09	3.67E-09
132000	9.90E-17	1.79E-15	2.41E-14	2.29E-13	1.44E-12	9.34E-12	4.37E-11	1.74E-10	6.00E-10	1.84E-09
136169	4.92E-18	1.13E-16	1.05E-15	1.69E-14	1.29E-13	7.73E-13	3.80E-12	1.50E-11	5.67E-11	1.81E-10
150000	2.37E-18	5.64E-17	8.59E-16	9.00E-15	4.37E-14	2.30E-13	9.29E-12	3.40E-11	1.10E-10	3.19E-10
165000	8.72E-19	2.45E-17	4.27E-16	3.07E-15	4.42E-14	2.90E-13	1.03E-12	3.05E-11	9.05E-11	2.60E-10
154000	9.79E-20	3.30E-18	7.04E-17	9.77E-16	9.74E-15	7.40E-14	4.40E-13	2.25E-12	9.37E-12	3.50E-11
150000	9.44E-20	3.50E-18	6.07E-17	1.10E-15	1.27E-14	1.02E-13	6.45E-13	3.37E-12	1.49E-11	5.72E-11
104000	1.31E-23	9.04E-22	3.42E-20	7.99E-19	1.24E-17	1.40E-16	1.21E-15	6.29E-14	2.25E-13	9.34E-13
194000	1.17E-24	1.01E-22	4.05E-21	1.20E-19	3.60E-17	1.00E-16	2.91E-16	2.22E-15	1.30E-14	7.21E-14
170000	2.91E-23	1.44E-20	4.14E-19	7.50E-18	9.61E-17	9.03E-16	6.40E-15	3.91E-14	1.94E-13	8.24E-13
170000	3.49E-23	2.15E-21	7.12E-20	1.54E-18	2.39E-16	1.94E-15	1.27E-14	6.80E-14	3.14E-13	1.25E-12
216000	5.90E-28	8.64E-26	6.13E-24	2.44E-22	6.20E-21	1.07E-19	1.34E-18	1.20E-17	9.90E-17	6.24E-16
225000	7.14E-29	1.27E-26	1.00E-24	5.09E-23	1.44E-21	2.63E-20	3.94E-19	6.10E-18	3.49E-17	2.30E-16
234000	1.34E-28	2.24E-26	1.94E-24	9.82E-23	2.57E-21	4.92E-20	6.79E-19	7.11E-18	5.07E-17	3.90E-16
235000	1.63E-29	3.45E-27	3.45E-25	1.89E-23	6.04E-22	1.30E-20	2.00E-18	2.30E-17	1.51E-16	9.10E-16
243000	2.74E-31	7.50E-29	6.92E-27	5.40E-25	2.15E-23	5.30E-22	9.13E-21	1.17E-19	1.14E-18	9.10E-18
252000	3.20E-32	1.04E-29	1.57E-27	1.17E-25	1.40E-23	1.40E-22	2.09E-21	3.70E-20	4.07E-19	3.49E-18

TABLE 47 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C

LEVEL	TEMPERATURE (806 K)										
	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000	20000
1Cm-1)											
0	9.89E-02	9.60E-02	9.40E-02	9.40E-02	9.20E-02	9.94E-02	8.77E-02	8.54E-02	8.30E-02	7.77E-02	7.44E-02
16	2.94E-01	2.93E-01	2.87E-01	2.81E-01	2.79E-01	2.46E-01	2.43E-01	2.34E-01	2.41E-01	2.37E-01	2.34E-01
43	6.91E-01	6.87E-01	6.77E-01	6.67E-01	6.58E-01	4.47E-01	4.37E-01	4.24E-01	4.14E-01	4.01E-01	3.78E-01
10194	1.07E-01	1.13E-01	1.24E-01	1.30E-01	1.49E-01	1.58E-01	1.65E-01	1.71E-01	1.75E-01	1.79E-01	1.80E-01
21648	3.69E-03	4.35E-03	5.63E-03	7.01E-03	8.35E-03	9.72E-03	1.10E-02	1.22E-02	1.33E-02	1.43E-02	1.52E-02
33735	3.19E-03	3.02E-03	5.82E-03	8.23E-03	1.10E-02	1.40E-02	1.73E-02	2.06E-02	2.39E-02	2.71E-02	3.30E-02
64091	9.98E-05	1.45E-04	3.29E-04	6.48E-04	1.15E-03	1.86E-03	2.81E-03	4.03E-03	5.49E-03	7.19E-03	9.09E-03
79234	1.12E-05	1.75E-05	4.59E-05	1.02E-04	2.06E-04	3.54E-04	5.79E-04	8.69E-04	1.28E-03	1.77E-03	2.34E-03
105401	3.85E-08	7.20E-07	2.81E-07	8.73E-07	2.27E-06	5.11E-06	1.03E-05	1.89E-05	3.22E-05	5.13E-05	7.73E-05
97078	2.10E-07	3.75E-07	1.32E-06	3.74E-06	9.08E-06	1.92E-05	3.47E-05	6.43E-05	1.05E-04	1.61E-04	2.35E-04
119478	4.67E-09	5.50E-09	4.44E-08	1.61E-07	4.77E-07	1.20E-06	2.67E-06	5.34E-06	9.77E-06	1.64E-05	2.64E-05
150000	1.53E-10	3.74E-10	2.40E-09	1.31E-08	5.10E-08	1.63E-07	4.65E-07	1.07E-06	2.39E-06	5.16E-06	1.10E-05
158000	2.57E-11	6.37E-11	5.00E-10	2.70E-09	1.17E-08	3.99E-08	1.15E-07	2.80E-07	6.67E-07	1.32E-06	2.47E-06
181000	1.64E-13	4.80E-13	5.02E-12	3.53E-11	1.83E-10	7.50E-10	2.53E-09	7.29E-09	1.85E-08	4.75E-08	1.14E-07
40774	1.31E-04	1.87E-04	4.06E-04	1.12E-03	1.32E-03	2.64E-03	3.09E-03	4.54E-03	5.81E-03	7.50E-03	9.35E-03
69722	1.03E-04	1.55E-04	3.70E-04	7.92E-04	1.47E-03	2.50E-03	3.94E-03	5.82E-03	8.10E-03	1.10E-02	1.43E-02
78424	4.64E-05	7.59E-05	2.02E-04	4.85E-04	9.30E-04	1.70E-03	2.89E-03	4.44E-03	6.33E-03	9.14E-03	1.23E-02
78184	9.64E-06	1.53E-05	4.17E-05	9.57E-05	1.93E-04	3.49E-04	5.83E-04	9.07E-04	1.33E-03	1.86E-03	2.50E-03
80844	1.94E-05	3.12E-05	8.81E-05	2.00E-04	4.30E-04	7.94E-04	1.25E-03	2.14E-03	3.19E-03	4.51E-03	6.13E-03
83850	2.07E-05	3.39E-05	9.93E-05	2.43E-04	5.15E-04	9.74E-04	1.69E-03	2.72E-03	4.12E-03	5.92E-03	8.19E-03
84000	2.03E-05	4.44E-05	1.34E-04	3.34E-04	7.08E-04	1.35E-03	2.33E-03	3.74E-03	5.70E-03	8.20E-03	1.13E-02
116000	6.88E-06	1.33E-05	5.93E-05	1.30E-04	5.84E-04	1.43E-03	3.10E-03	5.05E-03	7.89E-03	1.18E-02	1.75E-02
125000	5.20E-08	1.04E-07	5.40E-07	2.10E-06	6.50E-06	1.71E-05	3.92E-05	8.04E-05	1.52E-04	2.63E-04	4.33E-04
132000	3.04E-08	6.04E-08	3.64E-07	1.51E-06	4.92E-06	1.30E-05	3.34E-05	7.17E-05	1.40E-04	2.53E-04	4.28E-04
136149	3.25E-09	7.29E-09	4.24E-08	1.83E-07	6.29E-07	1.80E-06	4.48E-06	9.84E-06	1.97E-05	3.62E-05	6.70E-05
138000	2.04E-09	4.47E-09	2.70E-08	1.22E-07	4.28E-07	1.25E-06	3.13E-06	6.91E-06	1.41E-05	2.61E-05	4.30E-05
145000	2.14E-09	5.12E-09	3.34E-08	1.59E-07	5.92E-07	1.82E-06	4.60E-06	1.11E-05	2.33E-05	4.47E-05	7.94E-05
154000	9.35E-10	2.34E-09	1.71E-08	9.99E-08	3.44E-07	1.20E-06	3.37E-06	8.27E-06	1.81E-05	3.63E-05	6.70E-05
158000	1.64E-09	4.20E-09	3.25E-08	1.78E-07	7.49E-07	2.35E-06	7.05E-06	1.82E-05	4.14E-05	8.43E-05	1.54E-04
184000	1.13E-11	3.37E-11	3.64E-10	2.64E-09	1.42E-08	9.95E-08	2.05E-07	6.02E-07	1.55E-06	3.54E-06	7.64E-06
194000	4.47E-12	1.42E-11	1.70E-10	1.12E-09	8.34E-09	3.79E-08	1.40E-07	4.35E-07	1.10E-06	2.93E-06	6.22E-06
170000	3.04E-11	6.41E-11	7.61E-10	4.75E-09	2.35E-08	8.34E-08	2.62E-07	7.84E-07	1.89E-06	3.43E-06	7.18E-06
179000	1.41E-11	1.08E-11	4.17E-10	2.87E-09	1.47E-08	5.90E-08	1.84E-07	5.59E-07	1.40E-06	3.15E-06	6.59E-06
216000	4.21E-14	2.23E-13	3.83E-12	3.83E-11	3.83E-10	1.43E-09	4.76E-09	2.24E-08	6.87E-08	1.84E-07	4.41E-07
225000	2.80E-14	1.04E-13	2.03E-12	2.31E-11	1.80E-10	1.04E-09	4.76E-09	1.79E-08	5.70E-08	1.59E-07	3.94E-07
224000	4.60E-14	1.70E-13	3.26E-12	3.67E-11	2.83E-10	1.63E-09	7.37E-09	2.75E-08	8.73E-08	2.43E-07	1.37E-06
233000	2.14E-14	8.65E-14	1.70E-12	2.22E-11	1.84E-10	1.15E-09	5.52E-09	2.17E-08	7.25E-08	2.10E-07	5.41E-07
243000	1.63E-15	6.32E-15	1.63E-13	2.25E-12	2.07E-11	1.30E-10	7.14E-10	2.96E-09	1.02E-08	3.15E-08	9.54E-08
252000	7.51E-16	3.37E-15	8.92E-14	1.36E-12	1.34E-11	9.76E-11	5.34E-10	2.34E-09	8.71E-09	2.74E-08	7.69E-08

TABLE 47 (CONT.)-1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C

LEVEL (CN-1)	TEMPERATURE (DEG K)									
	24000	28000	32000	36200	40000	44000	48000	0	0	0
0	4.25E-02	5.04E-02	4.00E-02	3.17E-02	2.53E-02	2.05E-02	1.60E-02	0.	0.	0.
16	1.37E-01	1.51E-01	1.20E-01	9.51E-02	7.68E-02	6.15E-02	5.09E-02	0.	0.	0.
43	3.12E-01	2.52E-01	2.00E-01	1.50E-01	1.24E-01	1.02E-01	8.41E-02	0.	0.	0.
10104	1.70E-01	1.42E-01	1.27E-01	1.04E-01	8.78E-02	7.35E-02	6.20E-02	0.	0.	0.
21648	1.71E-02	1.66E-02	1.51E-02	1.33E-02	1.16E-02	1.01E-02	8.80E-03	0.	0.	0.
33735	4.14E-02	4.44E-02	4.39E-02	4.12E-02	3.74E-02	3.40E-02	3.04E-02	0.	0.	0.
44021	2.91E-02	2.81E-02	2.64E-02	2.47E-02	2.19E-02	1.96E-02	1.70E-02	0.	0.	0.
75256	6.18E-03	9.58E-03	1.23E-02	1.61E-02	1.52E-02	1.50E-02	1.50E-02	0.	0.	0.
102801	3.30E-04	6.59E-04	1.05E-03	1.39E-03	1.49E-03	1.93E-03	2.12E-03	0.	0.	0.
197878	8.95E-04	1.69E-03	2.49E-03	3.17E-03	3.75E-03	4.18E-03	4.48E-03	0.	0.	0.
119876	1.42E-04	3.20E-04	5.48E-04	7.90E-04	1.02E-03	1.23E-03	1.39E-03	0.	0.	0.
150000	7.09E-05	2.04E-04	4.24E-04	7.11E-04	1.03E-03	1.37E-03	1.69E-03	0.	0.	0.
150000	2.51E-05	7.51E-05	1.64E-04	2.87E-04	4.31E-04	5.82E-04	7.59E-04	0.	0.	0.
181000	1.21E-04	4.61E-04	1.17E-03	2.79E-03	3.77E-03	5.15E-03	7.42E-03	0.	0.	0.
60776	1.94E-02	2.64E-02	3.12E-02	3.59E-02	3.42E-02	3.37E-02	3.27E-02	0.	0.	0.
60722	3.45E-02	5.05E-02	6.27E-02	7.04E-02	7.43E-02	7.59E-02	7.50E-02	0.	0.	0.
70426	3.41E-02	5.30E-02	7.04E-02	8.20E-02	9.05E-02	9.47E-02	9.63E-02	0.	0.	0.
78184	4.91E-03	1.09E-02	1.43E-02	1.67E-02	1.83E-02	1.91E-02	1.94E-02	0.	0.	0.
80844	1.77E-02	2.85E-02	3.80E-02	4.51E-02	4.98E-02	5.25E-02	5.37E-02	0.	0.	0.
83830	2.44E-02	4.07E-02	5.53E-02	6.67E-02	7.45E-02	7.93E-02	8.18E-02	0.	0.	0.
84000	3.42E-02	5.64E-02	7.70E-02	9.20E-02	1.04E-01	1.10E-01	1.14E-01	0.	0.	0.
116000	1.43E-03	3.12E-03	5.22E-03	7.38E-03	9.37E-03	1.11E-02	1.25E-02	0.	0.	0.
125000	2.51E-03	5.98E-03	1.04E-02	1.54E-02	2.03E-02	2.48E-02	2.84E-02	0.	0.	0.
132000	2.78E-03	6.84E-03	1.27E-02	1.95E-02	2.64E-02	3.20E-02	3.81E-02	0.	0.	0.
136169	4.28E-04	1.11E-03	2.11E-03	3.30E-03	4.54E-03	5.73E-03	6.82E-03	0.	0.	0.
130000	3.19E-04	8.40E-04	1.62E-03	2.55E-03	3.54E-03	4.50E-03	5.30E-03	0.	0.	0.
145000	5.30E-04	1.70E-03	3.54E-03	5.79E-03	8.28E-03	1.07E-02	1.31E-02	0.	0.	0.
150000	6.12E-04	1.89E-03	3.94E-03	6.73E-03	9.90E-03	1.33E-02	1.73E-02	0.	0.	0.
150000	1.54E-03	4.81E-03	1.09E-02	1.84E-02	2.76E-02	3.74E-02	4.73E-02	0.	0.	0.
184000	1.09E-04	4.27E-04	1.10E-03	2.19E-03	3.65E-03	5.40E-03	7.32E-03	0.	0.	0.
194000	1.07E-04	4.94E-04	1.25E-03	2.61E-03	4.33E-03	6.92E-03	9.64E-03	0.	0.	0.
170000	8.44E-05	2.92E-04	6.90E-04	1.20E-03	2.02E-03	2.84E-03	3.71E-03	0.	0.	0.
170000	8.75E-05	3.27E-04	8.19E-04	1.59E-03	2.59E-03	3.77E-03	5.04E-03	0.	0.	0.
214000	1.07E-05	5.19E-05	1.79E-04	4.07E-04	7.71E-04	1.26E-03	1.87E-03	0.	0.	0.
225000	1.11E-05	6.15E-05	2.07E-04	5.09E-04	9.91E-04	1.67E-03	2.54E-03	0.	0.	0.
230000	1.64E-05	9.10E-05	3.04E-04	7.39E-04	1.44E-03	2.43E-03	3.60E-03	0.	0.	0.
230000	1.72E-05	1.02E-04	3.61E-04	9.17E-04	1.66E-03	2.82E-03	4.99E-03	0.	0.	0.
245000	3.10E-04	2.04E-03	7.77E-03	2.07E-04	4.38E-04	7.84E-04	1.25E-03	0.	0.	0.
252000	3.36E-06	2.30E-05	9.22E-05	2.57E-04	5.63E-04	1.04E-03	1.70E-03	0.	0.	0.

TABLE 40. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			1200	1400	2000	2400	3000	3400	4000	4400	4800	5200
2s 2p ³ 3s ²	0	0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	19228	10	2.43E-10	7.74E-08	2.44E-06	2.44E-05	1.21E-04	4.40E-04	1.15E-03	2.47E-03	5.97E-03	9.70E-03
	28639	6	1.44E-15	8.19E-12	1.07E-09	6.68E-08	5.90E-07	3.50E-06	1.44E-05	4.60E-05	1.20E-04	2.80E-04
	88132	12	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3p	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d	0	0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	19228	10	2.43E-10	7.74E-08	2.44E-06	2.44E-05	1.21E-04	4.40E-04	1.15E-03	2.47E-03	5.97E-03	9.70E-03
	28639	6	1.44E-15	8.19E-12	1.07E-09	6.68E-08	5.90E-07	3.50E-06	1.44E-05	4.60E-05	1.20E-04	2.80E-04
	88132	12	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ²	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ³	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁴	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁵	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁶	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁷	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁸	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ⁹	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0
2s 2p ³ 3d ¹⁰	0	0	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34	1.14E-34
	121000	10	0	0	0	0	0	0	0	0	0	0
	142110	2	0	0	0	0	0	0	0	0	0	0
	158200	4	0	0	0	0	0	0	0	0	0	0

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
 MONITORING ENERGY LEVELS FROM MOORE (1949), ERIKSSON (1950), AND ERIKSSON AND JOHANSSON (1961)

TABLE 40 (CONT.-). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N

LEVEL (CM-1)	TEMPERATURE (CEG N)									
	4000	5200	5600	6000	6400	6800	7200	7600	8000	8400
0	9.92E-01	9.07E-01	9.82E-01	9.74E-01	9.64E-01	9.54E-01	9.45E-01	9.33E-01	9.20E-01	9.06E-01
19228	7.79E-03	1.21E-02	1.76E-02	2.42E-02	3.20E-02	4.09E-02	5.07E-02	6.12E-02	7.24E-02	8.41E-02
28039	2.62E-04	5.07E-04	9.31E-04	1.45E-03	2.20E-03	3.21E-03	4.45E-03	5.95E-03	7.71E-03	9.73E-03
81132	1.00E-11	7.61E-11	4.32E-10	1.94E-09	7.32E-09	2.79E-08	6.37E-08	1.49E-07	3.61E-07	7.54E-07
121000	4.39E-16	7.12E-15	7.73E-14	6.10E-13	3.71E-12	1.82E-11	7.45E-11	2.83E-10	8.14E-10	2.26E-09
142110	1.57E-19	4.14E-18	6.02E-17	7.73E-16	6.44E-15	4.10E-14	2.19E-13	9.65E-13	3.65E-12	1.22E-11
156260	3.79E-21	1.45E-19	3.26E-18	4.69E-17	4.69E-16	4.16E-15	2.64E-14	1.38E-13	6.07E-13	2.32E-12
232900	7.14E-31	1.53E-28	1.52E-26	6.13E-25	2.44E-23	5.69E-22	6.69E-21	9.94E-20	8.04E-19	6.43E-18
84288	4.74E-11	3.31E-10	1.74E-09	7.31E-09	2.64E-08	7.73E-08	2.06E-07	4.93E-07	1.04E-06	2.19E-06
95780	4.55E-12	4.12E-11	2.78E-10	1.39E-09	5.01E-09	2.04E-08	6.21E-08	1.68E-07	4.10E-07	9.12E-07
104041	4.99E-13	5.57E-12	4.40E-11	2.63E-10	1.24E-09	4.90E-09	1.69E-08	5.02E-08	1.34E-07	3.23E-07
103841	1.35E-13	1.57E-12	1.14E-11	6.69E-11	3.53E-10	1.23E-09	4.12E-09	1.21E-08	3.20E-08	7.64E-08
107420	1.79E-13	1.95E-12	1.37E-11	8.55E-11	4.24E-10	1.74E-09	6.07E-09	1.85E-08	5.04E-08	1.25E-07
110315	9.73E-14	1.23E-12	1.08E-11	7.12E-11	3.69E-10	1.57E-09	5.67E-09	1.79E-08	5.01E-08	1.27E-07
110441	1.51E-13	1.67E-12	1.47E-11	9.67E-11	5.02E-10	2.14E-09	7.76E-09	2.44E-08	6.89E-08	1.74E-07
99464	2.63E-13	2.61E-12	1.80E-11	1.02E-10	4.49E-10	1.64E-09	5.30E-09	1.49E-08	3.78E-08	8.74E-08
110973	2.64E-14	3.42E-13	3.05E-12	2.03E-11	1.04E-10	4.59E-10	1.64E-09	5.26E-09	1.48E-08	3.78E-08
121000C	2.20E-15	3.54E-14	3.07E-13	3.05E-12	1.95E-11	9.69E-11	3.73E-10	4.07E-09	1.13E-08	2.02E-08
124406	2.39E-15	4.41E-14	4.01E-13	4.12E-12	2.44E-11	1.34E-10	5.81E-10	2.13E-09	6.82E-09	1.53E-08
114279	3.62E-16	5.24E-15	5.20E-14	3.70E-13	2.14E-12	9.07E-12	3.83E-11	1.26E-10	3.81E-10	1.01E-09
120400	2.07E-17	5.51E-16	6.93E-15	6.21E-14	4.21E-13	2.30E-12	1.02E-11	3.88E-11	1.29E-10	3.82E-10
137900	3.12E-18	7.41E-17	1.12E-15	1.17E-14	9.08E-14	5.54E-13	2.74E-12	1.14E-11	1.34E-10	1.34E-09
162000	2.40E-18	6.02E-17	1.12E-15	1.27E-14	1.04E-13	6.84E-13	3.59E-12	1.50E-11	5.94E-11	1.50E-10
152000	2.70E-19	9.15E-18	1.07E-16	1.07E-15	2.31E-14	1.80E-13	1.12E-12	5.32E-12	2.33E-11	8.47E-11
154000	1.95E-19	7.09E-18	1.54E-16	2.21E-15	2.27E-14	1.77E-13	1.09E-12	5.57E-12	2.44E-11	9.01E-11
192000	6.70E-24	3.62E-22	2.50E-20	4.65E-19	1.17E-17	1.47E-16	1.39E-15	1.03E-14	6.24E-14	3.19E-13
202000	6.02E-25	4.51E-23	3.40E-21	1.07E-19	2.20E-18	3.15E-17	3.54E-16	2.76E-15	1.84E-14	1.02E-13
219000	1.15E-26	1.62E-24	1.13E-22	4.44E-21	1.11E-19	1.80E-18	2.33E-17	2.21E-16	1.67E-15	1.04E-14
259000	2.62E-32	1.62E-29	1.70E-27	1.43E-25	6.95E-24	2.80E-22	4.33E-21	6.51E-20	7.45E-19	4.99E-18
331000	0.	0.	2.14E-35	6.17E-33	8.73E-31	6.00E-29	3.33E-27	1.07E-25	2.42E-24	4.03E-23
									5.25E-22	5.43E-21

TABLE 48 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF H

LEVEL (cm ⁻¹)	TEMPERATURE (1000 K)									
	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	8.42E-01	8.47E-01	8.50E-01	7.71E-01	7.39E-01	7.00E-01	6.60E-01	6.37E-01	6.00E-01	5.80E-01
19230	1.21E-01	1.37E-01	1.63E-01	1.93E-01	2.19E-01	2.43E-01	2.64E-01	2.83E-01	2.99E-01	3.12E-01
20030	1.72E-02	2.00E-02	2.39E-02	3.04E-02	3.58E-02	4.12E-02	4.66E-02	5.19E-02	5.72E-02	6.25E-02
20132	6.74E-06	2.39E-06	2.39E-06	5.94E-06	1.20E-05	2.40E-05	4.77E-05	9.91E-05	1.52E-04	2.19E-04
121000	2.87E-00	2.82E-00	2.70E-07	9.44E-07	2.81E-06	6.96E-06	1.52E-05	3.60E-05	5.43E-05	9.14E-05
142110	2.42E-10	5.30E-10	3.42E-09	1.33E-09	5.43E-09	1.94E-08	4.82E-07	9.90E-07	1.62E-06	3.30E-06
150300	6.82E-11	1.40E-10	1.29E-09	6.09E-09	2.74E-08	9.13E-08	2.37E-07	3.34E-07	1.40E-06	9.02E-06
237000	8.96E-16	3.54E-15	7.14E-14	6.62E-13	7.04E-12	4.23E-11	1.99E-10	7.47E-10	2.14E-09	1.02E-08
84200	1.27E-05	2.04E-05	5.97E-05	1.42E-04	2.94E-04	5.40E-04	9.44E-04	1.47E-03	2.18E-03	3.51E-03
97700	6.75E-06	1.18E-05	3.94E-05	1.07E-04	2.47E-04	5.62E-04	9.23E-04	1.54E-03	2.40E-03	3.79E-03
100401	2.90E-06	5.34E-06	2.01E-05	6.01E-05	1.51E-04	3.79E-04	6.44E-04	1.13E-03	1.91E-03	2.99E-03
107001	6.74E-07	1.23E-06	4.50E-06	1.30E-05	3.37E-05	7.29E-05	1.42E-04	2.52E-04	4.17E-04	6.40E-04
107430	1.19E-06	2.22E-06	6.63E-06	2.03E-05	6.01E-05	1.52E-04	3.82E-04	7.69E-04	1.46E-03	2.19E-03
110710	1.20E-06	2.44E-06	9.89E-06	3.13E-05	8.24E-05	1.80E-04	3.82E-04	7.69E-04	1.21E-03	1.97E-03
110041	1.74E-06	3.32E-06	1.34E-05	4.31E-05	1.14E-04	2.60E-04	5.20E-04	9.74E-04	1.47E-03	2.60E-03
99044	7.02E-07	1.29E-06	4.61E-06	1.29E-05	3.90E-05	6.24E-05	1.10E-04	2.04E-04	3.30E-04	5.03E-04
110773	3.07E-07	7.39E-07	3.01E-06	9.63E-06	2.90E-05	9.00E-05	1.92E-04	2.22E-04	5.00E-04	1.35E-03
121000	1.43E-07	2.91E-07	1.30E-06	4.02E-06	1.40E-05	3.40E-05	7.61E-05	1.50E-04	2.71E-04	4.57E-04
124000	2.66E-07	5.23E-07	2.70E-06	1.00E-05	3.61E-05	7.70E-05	1.73E-04	3.47E-04	6.40E-04	1.10E-03
116279	1.16E-06	2.30E-06	1.00E-07	3.40E-07	9.44E-07	2.24E-06	4.79E-06	9.17E-06	1.62E-05	2.67E-05
120000	5.60E-09	1.20E-08	6.17E-08	2.30E-07	7.42E-07	1.95E-06	4.40E-06	9.29E-06	1.74E-05	3.04E-05
137000	2.42E-09	5.42E-09	3.13E-08	1.33E-07	4.52E-07	1.20E-06	3.13E-06	6.60E-06	1.34E-05	2.49E-05
143000	3.94E-09	9.00E-09	5.59E-08	2.49E-07	8.79E-07	2.37E-06	6.49E-06	1.45E-05	2.94E-05	5.44E-05
150000	2.13E-09	5.24E-09	3.70E-08	1.07E-07	7.32E-07	2.34E-06	6.34E-06	1.52E-05	3.23E-05	6.37E-05
156000	2.42E-09	6.02E-09	4.95E-08	2.22E-07	9.32E-07	3.05E-06	8.40E-06	2.04E-05	4.49E-05	8.92E-05
160000	1.84E-11	5.75E-11	6.77E-10	5.23E-09	2.92E-08	1.27E-07	4.59E-07	1.37E-06	3.60E-06	8.47E-06
203000	7.34E-12	2.42E-11	3.25E-10	2.00E-09	1.72E-08	8.11E-08	3.80E-07	2.74E-06	6.77E-06	1.51E-05
215000	9.03E-13	3.00E-12	5.57E-11	5.52E-10	3.03E-09	2.00E-08	8.31E-08	2.80E-07	8.54E-07	2.24E-06
250000	1.64E-13	7.83E-13	2.15E-12	3.44E-12	3.50E-11	2.69E-10	1.49E-09	6.72E-09	2.52E-08	8.14E-08
331000	4.61E-20	3.30E-19	2.59E-17	6.40E-16	1.70E-14	2.21E-13	2.04E-12	1.91E-11	7.77E-11	3.52E-10

TABLE 48 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	24000	28000	32000	36000	40000	44000	48000	0	0	0
0	4.24E-01	3.33E-01	2.53E-01	1.91E-01	1.45E-01	1.12E-01	8.79E-02	0.	0.	0.
19228	3.36E-01	3.10E-01	2.67E-01	2.22E-01	1.82E-01	1.49E-01	1.24E-01	0.	0.	0.
28939	1.13E-01	1.04E-01	9.04E-02	7.72E-02	6.54E-02	5.54E-02	4.74E-02	0.	0.	0.
88132	1.48E-02	1.49E-02	1.45E-02	1.40E-02	1.35E-02	1.30E-02	1.25E-02	0.	0.	0.
121000	7.53E-04	1.64E-03	2.75E-03	3.80E-03	4.67E-03	5.39E-03	5.95E-03	0.	0.	0.
142110	4.25E-05	1.12E-04	2.13E-04	3.27E-04	4.59E-04	5.37E-04	6.21E-04	0.	0.	0.
158200	4.04E-05	1.47E-04	3.10E-04	5.15E-04	7.54E-04	9.51E-04	1.15E-03	0.	0.	0.
232800	5.52E-07	3.17E-04	1.08E-03	2.60E-03	5.01E-03	8.27E-03	1.23E-02	0.	0.	0.
84288	1.22E-02	1.37E-02	2.58E-02	2.94E-02	3.15E-02	3.26E-02	3.14E-02	0.	0.	0.
95780	1.64E-02	3.27E-02	4.61E-02	5.62E-02	6.25E-02	6.57E-02	6.72E-02	0.	0.	0.
104461	1.70E-02	3.42E-02	5.11E-02	6.51E-02	7.52E-02	8.14E-02	8.53E-02	0.	0.	0.
103861	3.79E-03	7.28E-03	1.07E-02	1.36E-02	1.56E-02	1.69E-02	1.78E-02	0.	0.	0.
107420	9.18E-03	1.88E-02	2.73E-02	3.53E-02	4.11E-02	4.51E-02	4.74E-02	0.	0.	0.
110315	1.29E-02	2.59E-02	4.09E-02	5.24E-02	6.18E-02	6.83E-02	7.25E-02	0.	0.	0.
110441	1.79E-02	3.48E-02	5.57E-02	7.29E-02	8.61E-02	9.52E-02	1.01E-01	0.	0.	0.
99664	2.71E-03	4.97E-03	7.17E-03	8.90E-03	1.01E-02	1.08E-02	1.11E-02	0.	0.	0.
110973	4.12E-03	8.33E-03	1.29E-02	1.70E-02	2.01E-02	2.23E-02	2.37E-02	0.	0.	0.
121030	3.77E-03	8.30E-03	1.37E-02	1.90E-02	2.34E-02	2.64E-02	2.92E-02	0.	0.	0.
124400	9.71E-03	2.21E-02	3.74E-02	5.26E-02	6.57E-02	7.61E-02	8.40E-02	0.	0.	0.
116279	2.00E-04	4.23E-04	6.88E-04	9.17E-04	1.11E-03	1.29E-03	1.39E-03	0.	0.	0.
128400	2.90E-04	6.81E-04	1.18E-03	1.63E-03	2.12E-03	2.52E-03	2.81E-03	0.	0.	0.
137500	2.80E-04	7.11E-04	1.31E-03	1.94E-03	2.56E-03	3.12E-03	3.54E-03	0.	0.	0.
142000	6.04E-04	1.60E-03	3.42E-03	5.25E-03	7.03E-03	8.65E-03	9.97E-03	0.	0.	0.
133800	9.95E-04	2.88E-03	5.07E-03	7.51E-03	1.03E-02	1.40E-02	2.02E-02	0.	0.	0.
156000	1.40E-03	4.39E-03	9.11E-03	1.59E-02	2.12E-02	2.73E-02	3.28E-02	0.	0.	0.
192000	2.80E-04	1.17E-03	3.25E-03	4.00E-03	4.82E-03	5.42E-03	1.00E-02	0.	0.	0.
202000	2.81E-04	1.24E-03	3.44E-03	7.15E-03	1.22E-02	1.82E-02	2.48E-02	0.	0.	0.
215000	1.21E-04	5.94E-04	1.81E-03	3.99E-03	7.15E-03	1.11E-02	1.57E-02	0.	0.	0.
230000	1.04E-05	7.68E-05	3.05E-04	8.40E-04	1.80E-03	3.23E-03	5.14E-03	0.	0.	0.
331000	1.93E-07	2.54E-06	1.63E-05	4.45E-05	1.04E-04	4.18E-04	8.69E-04	0.	0.	0.

TABLE 4-1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O

STATE	LEVEL (CM-1)	STAT.	TEMPERATURE (800 K)									
			1200	1600	2000	2400	2800	3200	3600	4000	4400	4800
2p ² 3p ²	0	5	6.07E-01	5.94E-01	5.70E-01	5.41E-01	5.15E-01	4.93E-01	4.75E-01	4.60E-01	4.48E-01	4.38E-01
	120	3	3.01E-01	3.00E-01	3.15E-01	3.17E-01	3.15E-01	3.12E-01	3.22E-01	3.23E-01	3.24E-01	3.24E-01
	226	1	0.27E-02	0.40E-02	0.40E-02	0.41E-02	0.41E-02	0.40E-02	0.40E-02	0.40E-02	0.40E-02	0.40E-02
	15004	5	3.31E-09	3.77E-07	4.44E-06	4.30E-05	4.44E-04	4.50E-03	1.04E-03	1.00E-03	1.00E-03	1.00E-03
	53792	1	3.00E-19	7.53E-15	3.25E-12	1.05E-10	3.32E-09	2.90E-08	1.50E-07	6.00E-07	1.00E-06	1.00E-06
2p ² 3p ² (5 ⁺)	126304	9	0.	0.	0.	1.7E-33	6.77E-29	2.29E-25	1.23E-22	1.93E-20	1.10E-18	1.10E-18
	109037	3	0.	0.	0.	0.	0.	2.94E-30	3.09E-34	7.50E-31	3.70E-28	3.70E-28
	277000	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	74003	0	0.	5.32E-20	3.72E-24	2.00E-20	1.70E-17	2.17E-15	9.13E-14	6.10E-12	2.00E-11	2.00E-11
	87379	24	0.	2.14E-30	1.41E-27	4.00E-23	0.77E-20	2.30E-17	1.07E-15	6.13E-14	1.00E-12	1.00E-12
2p ² 3p ² (5 ⁻)	97443	40	0.	6.19E-30	1.40E-26	1.00E-25	0.34E-22	4.31E-19	5.90E-17	2.70E-15	6.90E-14	6.90E-14
	95757	8	0.	3.01E-30	1.14E-26	1.00E-25	3.90E-22	1.04E-19	2.10E-17	1.00E-15	1.00E-14	1.00E-14
	99314	24	0.	0.	2.04E-31	3.00E-26	1.04E-22	1.12E-19	3.50E-17	0.37E-16	2.10E-14	2.10E-14
	102900	116	0.	0.	9.00E-32	2.10E-26	1.40E-22	1.00E-19	1.03E-17	1.11E-15	3.20E-14	3.20E-14
	101323	20	0.	0.	4.40E-32	6.90E-27	5.10E-23	3.45E-20	5.47E-18	3.13E-16	6.00E-15	6.00E-15
2p ² 3p ² (7 ⁺)	113400	60	0.	2.27E-35	3.00E-29	3.00E-25	4.53E-23	1.32E-19	1.32E-17	1.70E-17	5.02E-16	5.02E-16
	123000	100	0.	0.	0.	6.20E-32	2.53E-27	7.23E-24	3.52E-21	4.00E-19	2.00E-17	2.00E-17
	120700	320	0.	0.	0.	1.12E-32	7.02E-28	2.72E-24	1.40E-21	2.07E-19	1.00E-17	1.00E-17
	115416	12	0.	0.	2.52E-36	2.17E-30	9.04E-26	6.20E-23	1.00E-20	1.00E-18	7.00E-17	7.00E-17
	127000	36	0.	0.	0.	2.10E-33	1.10E-28	4.30E-25	2.40E-22	4.30E-20	2.01E-18	2.01E-18
2p ² 3p ² (7 ⁻)	130000	60	0.	0.	0.	0.	1.11E-30	7.70E-27	1.00E-24	1.00E-21	1.12E-19	1.12E-19
	142100	192	0.	0.	0.	2.25E-36	4.31E-31	3.97E-27	4.30E-24	1.00E-21	1.00E-19	1.00E-19
	212000	216	0.	0.	0.	0.	0.	0.	3.04E-24	1.00E-22	1.00E-20	1.00E-20
	222000	304	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	250000	180	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p ² 3p ² (5 ⁺)	260000	320	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	267000	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	290000	64	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	300000	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	314000	192	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p ² 3p ² (7 ⁻)	409000	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	419000	192	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUMLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949) AND BOWEN (1975)

TABLE 49 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O

LEVEL (C-1)	TEMPERATURE (DEG K)									
	4000	5200	5600	6000	6400	6800	7200	7600	8000	8400
0	5.64E-01	5.64E-01	5.61E-01	5.59E-01	5.56E-01	5.51E-01	5.43E-01	5.49E-01	5.40E-01	5.40E-01
150	3.24E-01	3.24E-01	3.23E-01	3.23E-01	3.22E-01	3.21E-01	3.20E-01	3.18E-01	3.16E-01	3.14E-01
226	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01
15444	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03	6.04E-03
33792	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04	6.04E-04
126304	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17	3.42E-17
189317	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26	6.04E-26
277000	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35	6.04E-35
74993	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10	6.04E-10
87379	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11	1.13E-11
97443	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13	9.39E-13
95737	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13	3.10E-13
99314	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13
102500	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13	5.20E-13
101323	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13	1.30E-13
113000	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14	1.11E-14
123000	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16	6.30E-16
128700	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15	1.73E-15
127900	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17	9.12E-17
130000	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16	7.34E-16
142100	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16	6.09E-16
212000	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17	6.17E-17
222000	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18	5.47E-18
230000	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13	3.20E-13
240000	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14	4.60E-14
267000	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17	1.77E-17
294000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
304000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
314000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
400000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
410000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TABLE 49 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O

LEVEL	TEMPERATURE (255 K)										
	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000	20000
0	5.34E-01	5.31E-01	5.24E-01	5.14E-01	5.00E-01	4.82E-01	4.60E-01	4.35E-01	4.08E-01	3.79E-01	3.48E-01
154	3.13E-01	3.11E-01	3.06E-01	3.00E-01	2.97E-01	2.92E-01	2.87E-01	2.82E-01	2.77E-01	2.72E-01	2.67E-01
226	1.03E-01	1.02E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01
15040	4.92E-02	4.91E-02	4.90E-02	4.89E-02	4.88E-02	4.87E-02	4.86E-02	4.85E-02	4.84E-02	4.83E-02	4.82E-02
31792	6.74E-04	6.71E-04	6.68E-04	6.65E-04	6.62E-04	6.59E-04	6.56E-04	6.53E-04	6.50E-04	6.47E-04	6.44E-04
126304	5.76E-09	5.72E-09	5.68E-09	5.64E-09	5.60E-09	5.56E-09	5.52E-09	5.48E-09	5.44E-09	5.40E-09	5.36E-09
109037	1.11E-13	1.10E-13	1.09E-13	1.08E-13	1.07E-13	1.06E-13	1.05E-13	1.04E-13	1.03E-13	1.02E-13	1.01E-13
277000	9.97E-20	9.95E-20	9.93E-20	9.91E-20	9.89E-20	9.87E-20	9.85E-20	9.83E-20	9.81E-20	9.79E-20	9.77E-20
74903	1.14E-05	1.13E-05	1.12E-05	1.11E-05	1.10E-05	1.09E-05	1.08E-05	1.07E-05	1.06E-05	1.05E-05	1.04E-05
87370	5.26E-06	5.24E-06	5.22E-06	5.20E-06	5.18E-06	5.16E-06	5.14E-06	5.12E-06	5.10E-06	5.08E-06	5.06E-06
97443	1.94E-06	1.92E-06	1.90E-06	1.88E-06	1.86E-06	1.84E-06	1.82E-06	1.80E-06	1.78E-06	1.76E-06	1.74E-06
95737	1.00E-07	9.98E-08	9.96E-08	9.94E-08	9.92E-08	9.90E-08	9.88E-08	9.86E-08	9.84E-08	9.82E-08	9.80E-08
99314	2.00E-07	1.99E-07	1.98E-07	1.97E-07	1.96E-07	1.95E-07	1.94E-07	1.93E-07	1.92E-07	1.91E-07	1.90E-07
102700	2.00E-06	1.99E-06	1.98E-06	1.97E-06	1.96E-06	1.95E-06	1.94E-06	1.93E-06	1.92E-06	1.91E-06	1.90E-06
101523	5.00E-07	4.99E-07	4.98E-07	4.97E-07	4.96E-07	4.95E-07	4.94E-07	4.93E-07	4.92E-07	4.91E-07	4.90E-07
113000	2.50E-07	2.49E-07	2.48E-07	2.47E-07	2.46E-07	2.45E-07	2.44E-07	2.43E-07	2.42E-07	2.41E-07	2.40E-07
123940	1.91E-07	1.90E-07	1.89E-07	1.88E-07	1.87E-07	1.86E-07	1.85E-07	1.84E-07	1.83E-07	1.82E-07	1.81E-07
120700	1.50E-07	1.49E-07	1.48E-07	1.47E-07	1.46E-07	1.45E-07	1.44E-07	1.43E-07	1.42E-07	1.41E-07	1.40E-07
110416	4.97E-08	4.96E-08	4.95E-08	4.94E-08	4.93E-08	4.92E-08	4.91E-08	4.90E-08	4.89E-08	4.88E-08	4.87E-08
127900	1.02E-08	1.01E-08	1.00E-08	9.99E-09	9.98E-09	9.97E-09	9.96E-09	9.95E-09	9.94E-09	9.93E-09	9.92E-09
130000	6.07E-08	6.06E-08	6.05E-08	6.04E-08	6.03E-08	6.02E-08	6.01E-08	6.00E-08	5.99E-08	5.98E-08	5.97E-08
142100	1.10E-08	1.09E-08	1.08E-08	1.07E-08	1.06E-08	1.05E-08	1.04E-08	1.03E-08	1.02E-08	1.01E-08	1.00E-08
212000	3.00E-13	2.99E-13	2.98E-13	2.97E-13	2.96E-13	2.95E-13	2.94E-13	2.93E-13	2.92E-13	2.91E-13	2.90E-13
222000	1.00E-13	9.99E-14	9.98E-14	9.97E-14	9.96E-14	9.95E-14	9.94E-14	9.93E-14	9.92E-14	9.91E-14	9.90E-14
230000	3.00E-16	2.99E-16	2.98E-16	2.97E-16	2.96E-16	2.95E-16	2.94E-16	2.93E-16	2.92E-16	2.91E-16	2.90E-16
240000	1.20E-16	1.19E-16	1.18E-16	1.17E-16	1.16E-16	1.15E-16	1.14E-16	1.13E-16	1.12E-16	1.11E-16	1.10E-16
250000	6.00E-16	5.99E-16	5.98E-16	5.97E-16	5.96E-16	5.95E-16	5.94E-16	5.93E-16	5.92E-16	5.91E-16	5.90E-16
260000	3.00E-16	2.99E-16	2.98E-16	2.97E-16	2.96E-16	2.95E-16	2.94E-16	2.93E-16	2.92E-16	2.91E-16	2.90E-16
270000	2.00E-16	1.99E-16	1.98E-16	1.97E-16	1.96E-16	1.95E-16	1.94E-16	1.93E-16	1.92E-16	1.91E-16	1.90E-16
300000	1.00E-16	9.99E-17	9.98E-17	9.97E-17	9.96E-17	9.95E-17	9.94E-17	9.93E-17	9.92E-17	9.91E-17	9.90E-17
310000	7.00E-20	6.99E-20	6.98E-20	6.97E-20	6.96E-20	6.95E-20	6.94E-20	6.93E-20	6.92E-20	6.91E-20	6.90E-20
400000	2.00E-25	1.99E-25	1.98E-25	1.97E-25	1.96E-25	1.95E-25	1.94E-25	1.93E-25	1.92E-25	1.91E-25	1.90E-25
410000	1.00E-26	9.99E-27	9.98E-27	9.97E-27	9.96E-27	9.95E-27	9.94E-27	9.93E-27	9.92E-27	9.91E-27	9.90E-27

TABLE 49 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O

LEVEL (CR-1)	TEMPERATURE (DEG K)									
	24000	26000	32000	36000	40000	44000	48000	52000	56000	60000
0	4.14E-01	3.57E-01	2.94E-01	2.34E-01	1.65E-01	1.47E-01	1.18E-01	0.	0.	0.
150	2.44E-01	2.12E-01	1.79E-01	1.46E-01	1.11E-01	9.76E-02	7.63E-02	0.	0.	0.
226	6.14E-02	5.09E-02	4.01E-02	3.07E-02	2.37E-02	2.01E-02	1.54E-02	0.	0.	0.
15000	1.44E-01	1.24E-01	1.04E-01	8.44E-02	6.44E-02	5.44E-02	4.44E-02	0.	0.	0.
33792	1.89E-02	1.24E-02	1.20E-02	1.21E-02	1.10E-02	9.73E-03	8.55E-03	0.	0.	0.
126304	3.87E-04	9.73E-04	1.01E-03	2.71E-03	3.55E-03	4.25E-03	4.81E-03	0.	0.	0.
189337	2.87E-06	1.24E-05	3.44E-05	7.13E-05	1.26E-04	1.77E-04	2.30E-04	0.	0.	0.
277000	5.86E-09	4.97E-08	2.29E-07	7.30E-07	1.74E-06	3.42E-06	5.83E-06	0.	0.	0.
74903	7.42E-03	1.27E-02	1.67E-02	1.84E-02	2.00E-02	2.03E-02	1.94E-02	0.	0.	0.
87379	1.09E-02	1.92E-02	2.77E-02	3.42E-02	3.94E-02	4.09E-02	4.12E-02	0.	0.	0.
97443	9.61E-03	1.91E-02	2.94E-02	3.82E-02	4.55E-02	4.89E-02	5.00E-02	0.	0.	0.
95757	2.13E-03	4.14E-03	6.34E-03	8.17E-03	9.44E-03	1.03E-02	1.07E-02	0.	0.	0.
99314	5.15E-03	1.04E-02	1.62E-02	2.13E-02	2.50E-02	2.74E-02	2.80E-02	0.	0.	0.
102900	2.01E-02	4.10E-02	6.67E-02	8.90E-02	1.04E-01	1.10E-01	1.23E-01	0.	0.	0.
101323	3.74E-03	7.74E-03	1.22E-02	1.42E-02	1.62E-02	1.73E-02	1.79E-02	0.	0.	0.
113409	5.47E-03	1.23E-02	2.13E-02	3.00E-02	3.74E-02	4.29E-02	4.60E-02	0.	0.	0.
123040	4.91E-03	1.22E-02	2.23E-02	3.31E-02	4.24E-02	4.90E-02	5.70E-02	0.	0.	0.
120700	1.14E-02	3.04E-02	5.74E-02	8.74E-02	1.14E-01	1.40E-01	1.59E-01	0.	0.	0.
114416	1.04E-03	2.39E-03	4.11E-03	5.81E-03	7.24E-03	8.34E-03	9.15E-03	0.	0.	0.
127900	1.39E-03	3.59E-03	6.72E-03	1.02E-02	1.34E-02	1.61E-02	1.83E-02	0.	0.	0.
130000	1.27E-03	3.54E-03	7.11E-03	1.13E-02	1.55E-02	1.92E-02	2.24E-02	0.	0.	0.
142100	3.17E-03	9.23E-03	1.69E-02	3.00E-02	4.24E-02	5.41E-02	6.39E-02	0.	0.	0.
212000	5.40E-05	2.84E-04	9.19E-04	2.12E-03	3.90E-03	5.19E-03	6.84E-03	0.	0.	0.
222000	5.27E-05	3.04E-04	1.04E-03	2.52E-03	4.94E-03	7.93E-03	1.14E-02	0.	0.	0.
250000	2.04E-06	2.24E-05	9.40E-05	2.81E-04	6.22E-04	1.19E-03	1.84E-03	0.	0.	0.
260000	2.79E-06	2.39E-05	1.10E-04	3.39E-04	7.72E-04	1.47E-03	2.44E-03	0.	0.	0.
297000	1.00E-07	1.01E-06	5.24E-06	1.74E-05	4.30E-05	8.00E-05	1.54E-04	0.	0.	0.
290000	9.23E-08	1.02E-06	5.70E-06	2.82E-05	5.25E-05	1.10E-04	1.94E-04	0.	0.	0.
304000	1.09E-07	1.27E-06	7.34E-06	2.40E-05	7.13E-05	1.53E-04	2.80E-04	0.	0.	0.
314000	1.04E-07	1.39E-06	8.33E-06	3.19E-05	8.93E-05	1.94E-04	3.69E-04	0.	0.	0.
409000	2.01E-10	5.74E-09	4.94E-08	4.83E-07	1.63E-06	4.93E-06	1.20E-05	0.	0.	0.
419000	1.94E-10	6.11E-09	7.42E-08	4.81E-07	2.03E-06	6.32E-06	1.59E-05	0.	0.	0.

TABLE 50. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				1200	1400	1600	1800	2000	2400	2800	3200	3600	4000
$3s^1 3p^1$ (1P_1)	0	0.	1	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09	1.00E-09
	114094	16.2397	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	95188	11.0815	4	0.	2.60E-37	7.39E-35	2.50E-29	2.67E-25	2.67E-25	2.67E-25	2.67E-25	2.67E-25	2.67E-25
	107421	13.3182	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	120721	16.9671	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
$3s^1 3p^1$ (3P_0)	121634	15.0426	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	112940	16.0034	40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	93371	11.5762	0	0.	2.74E-34	7.39E-35	2.50E-29	2.67E-25	2.67E-25	2.67E-25	2.67E-25	2.67E-25	2.67E-25
	109631	13.0942	24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	119211	16.7799	40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
$3s^1 3p^1$ (3P_1)	120222	16.9622	56	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	222090	21.3236	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	203000	25.1641	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	215000	26.6379	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	227900	28.2353	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
$3s^1 3p^1$ (3P_2)	120222	16.9622	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	222090	21.3236	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	203000	25.1641	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	215000	26.6379	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	227900	28.2353	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949), BURNS AND MOORE (1953), AND HUMPHREYS AND PAUL (1959)

TABLE 50 (CONT.1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar

LEVEL (C-1)	TEMPERATURE (DEG K)									
	9400	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	9.99E-01	9.97E-01	9.95E-01	9.90E-01	9.82E-01	9.70E-01
114854	6.49E-07	1.33E-06	5.76E-06	2.89E-05	6.33E-05	1.49E-04	3.27E-04	6.47E-04	1.18E-03	2.00E-03
93188	2.55E-06	4.51E-06	1.37E-05	4.42E-05	1.08E-04	2.23E-04	4.31E-04	7.59E-04	1.23E-03	1.93E-03
107421	1.22E-06	2.33E-06	9.49E-06	3.06E-05	8.23E-05	1.92E-04	4.00E-04	7.38E-04	1.23E-03	2.17E-03
120721	2.78E-07	5.72E-07	2.78E-06	1.03E-05	3.13E-05	1.06E-04	2.30E-04	3.82E-04	7.10E-04	1.23E-03
121654	3.38E-07	7.01E-07	3.44E-06	1.29E-05	3.97E-05	1.04E-04	2.30E-04	4.92E-04	9.20E-04	1.63E-03
112948	1.78E-06	3.50E-06	1.53E-05	5.25E-05	1.49E-04	3.63E-04	7.95E-04	1.54E-03	2.77E-03	4.64E-03
93371	6.49E-06	1.17E-05	3.97E-05	1.10E-04	2.60E-04	5.43E-04	1.03E-03	1.79E-03	2.91E-03	4.49E-03
109431	3.20E-06	6.02E-06	2.48E-05	7.50E-05	2.01E-04	4.62E-04	9.15E-04	1.70E-03	3.09E-03	5.01E-03
119211	6.46E-07	1.42E-06	6.76E-06	2.40E-05	7.44E-05	1.91E-04	4.30E-04	8.75E-04	1.63E-03	2.82E-03
120222	8.36E-07	1.72E-06	8.30E-06	3.00E-05	9.31E-05	2.41E-04	5.47E-04	1.12E-03	2.10E-03	3.62E-03
222000	7.10E-14	2.69E-13	4.90E-12	5.51E-11	4.26E-10	2.44E-09	1.12E-08	6.23E-08	3.14E-07	9.54E-07
203000	2.45E-13	8.27E-13	1.18E-11	1.07E-10	4.99E-10	3.47E-09	1.39E-08	6.47E-08	3.14E-07	8.09E-07
215000	1.22E-13	4.41E-13	7.34E-12	7.65E-11	5.55E-10	3.63E-09	1.37E-08	6.77E-08	3.14E-07	8.09E-07
227900	2.93E-14	1.15E-13	2.26E-12	2.71E-11	2.22E-10	1.54E-09	6.36E-09	2.49E-08	8.25E-08	2.38E-07
228900	3.53E-14	1.39E-13	2.76E-12	3.37E-11	2.78E-10	1.70E-09	8.12E-09	3.10E-08	1.04E-07	3.80E-07
229900	3.53E-14	1.39E-13	2.76E-12	3.37E-11	2.78E-10	1.70E-09	8.12E-09	3.10E-08	1.04E-07	3.80E-07

LEVEL (C-1)	TEMPERATURE (DEG K)									
	24000	28000	32000	36000	40000	44000	48000	0	0	0
0	7.83E-01	5.80E-01	4.01E-01	2.74E-01	1.95E-01	1.43E-01	1.06E-01	0.	0.	0.
114854	1.49E-02	3.17E-02	4.99E-02	5.60E-02	6.25E-02	6.67E-02	6.94E-02	0.	0.	0.
93188	1.04E-02	1.74E-02	2.22E-02	2.44E-02	2.54E-02	2.54E-02	2.54E-02	0.	0.	0.
107421	1.50E-02	2.79E-02	3.89E-02	4.32E-02	4.90E-02	5.10E-02	5.20E-02	0.	0.	0.
120721	1.13E-02	2.35E-02	3.53E-02	4.43E-02	5.04E-02	5.30E-02	5.42E-02	0.	0.	0.
121654	1.49E-02	3.17E-02	4.73E-02	5.97E-02	6.85E-02	7.43E-02	7.82E-02	0.	0.	0.
112948	3.90E-02	7.00E-02	1.00E-01	1.21E-01	1.34E-01	1.42E-01	1.47E-01	0.	0.	0.
93371	2.32E-02	3.93E-02	4.82E-02	5.20E-02	5.42E-02	5.52E-02	5.52E-02	0.	0.	0.
109431	3.34E-02	6.12E-02	8.34E-02	9.71E-02	1.05E-01	1.08E-01	1.10E-01	0.	0.	0.
119211	2.47E-02	5.07E-02	7.59E-02	9.41E-02	1.07E-01	1.10E-01	1.12E-01	0.	0.	0.
120222	3.23E-02	6.74E-02	1.01E-01	1.24E-01	1.44E-01	1.57E-01	1.62E-01	0.	0.	0.
222000	2.40E-05	1.29E-04	3.71E-04	7.73E-04	1.33E-03	2.01E-03	2.79E-03	0.	0.	0.
203000	1.62E-05	8.84E-05	1.74E-04	3.36E-04	5.25E-04	7.47E-04	9.86E-04	0.	0.	0.
215000	2.37E-05	1.11E-04	3.02E-04	6.14E-04	1.02E-03	1.51E-03	2.07E-03	0.	0.	0.
227900	1.82E-05	9.52E-05	2.65E-04	6.11E-04	1.07E-03	1.60E-03	2.34E-03	0.	0.	0.
228900	2.41E-05	1.27E-04	3.81E-04	8.22E-04	1.45E-03	2.24E-03	3.18E-03	0.	0.	0.

TABLE 51. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C.

STATE	LEVEL (CM-1)	STAT.	TEMPERATURE (DEG K)									
			1200	1600	2000	2400	2800	3200	3600	4000	4400	
2s 2p	0	2	3.51E-01	3.44E-01	3.44E-01	3.42E-01	3.41E-01	3.40E-01	3.39E-01	3.38E-01	3.38E-01	
	64	4	6.49E-01	6.54E-01	6.54E-01	6.54E-01	6.54E-01	6.40E-01	6.41E-01	6.42E-01	6.42E-01	
	43033	12	3.23E-23	3.25E-17	7.40E-14	1.28E-11	5.09E-10	8.04E-09	6.90E-08	3.89E-07	1.57E-06	
	79332	10	0.	9.43E-30	6.47E-24	5.29E-20	3.23E-17	3.97E-15	1.67E-13	3.33E-12	3.84E-11	
	96494	2	0.	7.16E-39	2.45E-31	2.45E-26	9.94E-24	4.89E-20	6.05E-18	2.84E-16	6.69E-15	
2p	110653	6	0.	0.	2.77E-35	1.59E-29	2.07E-25	2.52E-22	6.33E-20	5.24E-18	1.94E-16	
	142024	4	0.	0.	0.	7.21E-38	1.38E-32	1.25E-28	1.51E-25	4.41E-23	4.58E-21	
	150465	10	0.	0.	0.	0.	4.50E-34	7.04E-30	1.90E-26	5.29E-24	7.24E-22	
	168744	6	0.	0.	0.	0.	2.25E-36	1.14E-33	5.23E-30	4.43E-27	1.10E-24	
	116538	2	0.	0.	1.34E-37	1.54E-31	3.35E-27	5.94E-24	2.01E-21	2.11E-19	9.53E-18	
2s (5)	131725	6	0.	0.	0.	5.17E-35	4.10E-30	1.93E-26	1.39E-23	2.68E-21	1.99E-19	
	145550	10	0.	0.	0.	2.18E-38	5.62E-33	6.44E-29	9.24E-26	3.10E-23	3.61E-21	
	157235	2	0.	0.	0.	0.	2.77E-36	6.73E-32	1.73E-28	9.27E-26	1.54E-23	
	162523	6	0.	0.	0.	0.	5.50E-37	1.57E-32	6.28E-29	4.15E-26	8.43E-24	
	168125	10	0.	0.	0.	0.	5.15E-38	2.52E-33	1.12E-29	9.22E-27	2.23E-24	
2p	168979	14	0.	0.	0.	0.	4.65E-38	2.40E-33	1.11E-29	9.50E-27	2.30E-24	
	170443	12	0.	0.	0.	0.	2.54E-38	1.44E-33	7.34E-30	6.71E-27	1.72E-24	
	184786	50	0.	0.	0.	0.	0.	7.38E-36	7.73E-32	1.24E-28	5.23E-26	
	197742	90	0.	0.	0.	0.	0.	7.28E-34	1.94E-30	1.24E-27	1.24E-27	
	210000**	18	0.	0.	0.	0.	0.	0.	1.08E-36	4.77E-33	4.57E-30	
(p*)	215730**	54	0.	0.	0.	0.	0.	0.	3.29E-37	1.82E-33	2.11E-30	
	220445	90	0.	0.	0.	0.	0.	0.	0.	5.53E-34	7.47E-31	
	221458	126	0.	0.	0.	0.	0.	0.	0.	5.42E-34	7.54E-31	
	219000*	4	0.	0.	0.	0.	0.	0.	9.89E-39	6.25E-35	8.04E-32	
	234000*	18	0.	0.	0.	0.	0.	0.	0.	5.50E-37	1.79E-33	
2p	244000*	30	0.	0.	0.	0.	0.	0.	0.	0.	5.88E-35	
	246000*	6	0.	0.	0.	0.	0.	0.	0.	0.	1.21E-27	
	245000*	18	0.	0.	0.	0.	0.	0.	0.	0.	7.07E-38	
	270900*	30	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	271400*	42	0.	0.	0.	0.	0.	0.	0.	0.	0.	
2p (p)	257000*	18	0.	0.	0.	0.	0.	0.	0.	0.	9.48E-37	
	271000*	54	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	281000*	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	292000*	50	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	313000*	140	0.	0.	0.	0.	0.	0.	0.	0.	0.	
(s)	319000*	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	349000*	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	349000*	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	349000*	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	349000*	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONITORING ENERGY LEVELS FROM MOORE (1949) AND GLAD (1954)

TABLE 51 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C⁺

LEVEL (C _{II} -1)	TEMPERATURE (DEG K)											
	4000	5200	5600	6000	6400	6800	7200	7600	8000	8400	8800	9200
C	3.38E-01	3.37E-01	3.37E-01	3.37E-01	3.36E-01	3.36E-01	3.35E-01	3.34E-01	3.34E-01	3.33E-01	3.33E-01	3.33E-01
64	6.82E-01	6.83E-01	6.83E-01	6.83E-01	6.82E-01	6.82E-01	6.81E-01	6.81E-01	6.81E-01	6.80E-01	6.80E-01	6.80E-01
43033	5.04E-05	1.34E-05	6.67E-05	1.34E-05	6.67E-05	1.34E-05	6.67E-05	1.34E-05	6.67E-05	1.34E-05	6.67E-05	1.34E-05
74932	2.97E-10	1.67E-09	7.34E-09	2.65E-08	1.33E-08	6.13E-08	2.98E-07	1.16E-06	4.47E-06	1.64E-05	6.01E-05	2.34E-04
96494	9.27E-14	6.57E-13	5.74E-12	5.01E-11	1.28E-10	4.57E-10	1.42E-09	3.11E-09	7.93E-09	2.23E-08	4.71E-08	9.33E-08
110653	3.99E-15	5.11E-14	4.55E-13	3.02E-12	1.59E-11	6.89E-11	2.51E-10	8.95E-10	2.29E-09	5.91E-09	1.40E-08	3.84E-08
142024	2.19E-19	5.70E-18	9.50E-17	1.09E-15	9.13E-15	9.90E-14	3.10E-13	1.41E-12	5.82E-12	1.83E-11	5.91E-11	1.51E-10
150465	4.37E-20	1.40E-18	2.74E-17	3.60E-16	1.47E-15	1.47E-14	1.47E-13	7.15E-13	1.00E-12	1.00E-11	3.47E-11	1.01E-10
167734	1.09E-22	3.39E-21	1.50E-19	2.70E-18	3.38E-17	1.03E-16	2.29E-15	1.35E-14	6.82E-14	2.82E-13	1.09E-12	3.47E-12
116530	2.28E-16	3.34E-15	2.44E-14	2.44E-13	1.41E-12	6.50E-12	2.59E-11	8.00E-11	2.65E-10	7.19E-10	1.70E-09	4.07E-09
131725	7.21E-18	1.50E-16	2.03E-15	1.93E-14	1.39E-13	7.93E-13	3.73E-12	1.49E-11	5.10E-11	1.60E-10	4.44E-10	1.14E-09
145550	1.09E-19	5.40E-18	6.40E-17	1.17E-15	1.04E-14	7.09E-14	3.92E-13	1.81E-12	7.10E-12	2.50E-11	7.79E-11	2.10E-10
157235	1.15E-21	6.30E-20	9.62E-19	1.42E-17	1.50E-16	1.20E-15	7.40E-15	3.97E-14	1.74E-13	6.79E-13	2.79E-12	7.01E-12
162523	7.05E-22	2.99E-20	7.42E-19	1.20E-17	1.37E-16	1.17E-15	7.92E-15	4.37E-14	2.04E-13	8.15E-13	2.90E-12	9.19E-12
168125	2.19E-22	1.04E-20	2.93E-19	5.21E-18	6.47E-17	5.98E-16	4.31E-15	2.52E-14	1.24E-13	5.22E-13	1.93E-12	6.20E-12
168979	2.38E-22	1.17E-20	3.29E-19	5.95E-18	7.49E-17	6.90E-16	5.09E-15	3.01E-14	1.49E-13	6.32E-13	2.35E-12	7.01E-12
170643	1.04E-22	9.40E-21	2.74E-19	5.13E-18	6.42E-17	6.32E-16	4.69E-15	2.82E-14	1.42E-13	6.11E-13	2.30E-12	7.74E-12
184788	8.01E-24	5.40E-22	2.19E-20	5.18E-19	8.24E-18	9.50E-17	8.34E-16	5.82E-15	3.34E-14	1.63E-13	6.89E-13	2.54E-12
197742	2.75E-25	2.95E-23	1.31E-21	3.84E-20	7.48E-19	1.03E-17	1.04E-16	6.34E-16	3.42E-15	2.95E-14	1.31E-13	5.59E-13
210000	1.40E-27	1.77E-25	1.12E-23	4.09E-22	9.51E-21	1.53E-19	1.80E-18	1.04E-16	1.20E-16	7.22E-16	3.70E-15	1.64E-14
213730	7.52E-28	1.09E-25	7.72E-24	3.10E-22	7.87E-21	1.34E-19	1.72E-18	1.04E-17	1.23E-16	8.11E-16	4.39E-15	2.01E-14
220465	3.03E-28	4.89E-26	3.81E-24	1.64E-22	4.52E-21	6.34E-20	1.11E-18	1.13E-17	9.10E-17	6.01E-16	3.34E-15	1.60E-14
221958	3.15E-28	5.20E-26	4.13E-24	1.83E-22	5.04E-21	7.44E-20	1.20E-18	1.31E-17	1.07E-16	7.10E-16	3.90E-15	1.92E-14
219000	3.14E-29	4.89E-27	3.70E-25	1.57E-23	4.19E-22	7.50E-21	9.94E-20	5.94E-19	7.90E-18	5.15E-17	2.83E-16	1.34E-15
234000	1.05E-30	2.31E-28	2.35E-26	1.29E-24	4.31E-23	9.52E-22	1.49E-20	1.74E-19	1.40E-18	1.10E-17	7.31E-17	3.05E-16
244000	4.79E-32	1.30E-29	1.80E-27	1.21E-25	4.84E-24	1.25E-22	2.24E-21	3.00E-20	3.07E-19	2.52E-18	1.71E-17	9.83E-17
260000	1.44E-34	5.79E-32	9.89E-30	8.44E-28	4.16E-26	1.29E-24	2.79E-23	4.23E-22	4.95E-21	4.59E-20	3.47E-19	2.20E-18
265000	9.47E-35	4.39E-32	8.18E-30	7.65E-28	3.04E-26	1.35E-24	3.04E-23	4.93E-22	6.05E-21	5.89E-20	4.60E-19	3.02E-18
270500	3.10E-35	1.59E-32	3.32E-30	3.41E-28	1.94E-26	7.02E-25	1.69E-23	2.90E-22	3.75E-21	3.00E-20	3.12E-19	2.19E-18
271400	3.31E-35	1.73E-32	3.69E-30	3.89E-28	2.25E-26	8.12E-25	1.97E-23	3.42E-22	4.46E-21	4.54E-20	3.77E-19	2.59E-18
257000	1.04E-33	3.90E-31	6.39E-29	5.21E-27	2.45E-25	7.33E-24	1.50E-22	2.24E-21	2.55E-20	2.30E-19	1.70E-18	1.04E-17
271000	4.80E-35	2.49E-32	5.29E-30	5.44E-28	3.14E-26	1.14E-24	2.79E-23	4.79E-22	6.17E-21	6.20E-20	5.17E-19	3.59E-18
283000	2.19E-34	1.49E-33	4.01E-31	5.11E-29	1.50E-27	4.14E-26	8.14E-25	1.19E-24	1.14E-23	1.14E-22	1.21E-21	9.69E-21
304500	0.	1.25E-35	5.12E-33	9.42E-31	9.01E-29	5.04E-27	1.81E-25	4.44E-24	7.95E-23	1.60E-22	1.15E-21	1.60E-20
267000	2.91E-35	1.39E-32	2.72E-30	2.63E-28	1.44E-26	4.91E-25	1.13E-23	1.87E-22	2.34E-21	2.31E-20	1.84E-19	1.23E-18
281000	1.33E-34	8.64E-34	2.23E-31	2.79E-29	1.95E-27	7.41E-26	2.07E-24	3.97E-23	5.67E-22	6.20E-21	5.60E-20	4.13E-19
293000	8.21E-38	6.80E-35	2.21E-32	3.20E-30	2.40E-28	1.24E-26	3.84E-25	2.20E-24	1.31E-22	1.50E-21	1.50E-20	1.23E-19
315000	0.	6.80E-37	3.20E-34	4.82E-32	7.42E-30	4.64E-28	4.95E-26	4.95E-25	9.50E-24	1.40E-23	1.40E-22	1.40E-21
319000	0.	0.	7.71E-36	1.82E-33	2.17E-31	1.47E-29	6.25E-28	1.70E-26	3.58E-25	5.63E-24	6.73E-23	4.50E-22
349000	0.	0.	0.	2.53E-38	4.54E-34	4.50E-32	2.77E-30	1.09E-28	2.95E-27	5.80E-26	8.67E-25	1.60E-23

TABLE 51 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C⁺

LEVEL (CM-1)	TEMPERATURE (DEG K)											
	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000
0	3.34E-01	3.34E-01	3.33E-01	3.31E-01	3.29E-01	3.27E-01	3.24E-01	3.21E-01	3.17E-01	3.13E-01	3.09E-01	3.04E-01
64	6.62E-01	6.62E-01	6.60E-01	6.57E-01	6.54E-01	6.50E-01	6.44E-01	6.37E-01	6.30E-01	6.23E-01	6.14E-01	6.09E-01
43033	3.17E-03	4.10E-03	7.17E-03	1.14E-02	1.69E-02	2.35E-02	3.13E-02	4.01E-02	4.93E-02	6.02E-02	7.12E-02	8.26E-02
74932	2.22E-05	3.47E-05	9.22E-05	2.00E-04	4.12E-04	7.39E-04	1.22E-03	1.90E-03	2.79E-03	3.92E-03	5.30E-03	6.93E-03
96494	1.75E-07	3.12E-07	1.10E-06	3.13E-06	7.57E-06	1.61E-05	3.09E-05	5.44E-05	9.00E-05	1.40E-04	2.07E-04	2.94E-04
110453	4.30E-08	1.22E-07	5.17E-07	1.72E-06	4.74E-06	1.13E-05	2.39E-05	4.59E-05	8.14E-05	1.35E-04	2.13E-04	3.19E-04
142024	3.81E-10	8.02E-10	5.69E-09	2.64E-08	9.81E-08	2.99E-07	7.89E-07	1.82E-06	3.12E-06	5.35E-06	8.72E-06	1.22E-05
150445	2.69E-10	6.62E-10	4.72E-09	2.42E-08	9.64E-08	3.14E-07	7.74E-07	1.73E-06	3.04E-06	5.04E-06	7.94E-06	1.14E-05
160744	1.04E-11	2.84E-11	2.59E-10	1.62E-09	7.65E-09	2.89E-08	9.08E-08	2.47E-07	5.84E-07	1.30E-06	2.81E-06	4.88E-06
116330	8.69E-09	1.74E-08	7.98E-08	2.83E-07	8.24E-07	2.89E-06	4.32E-06	5.91E-06	1.65E-05	2.82E-05	4.54E-05	6.95E-05
131725	2.66E-09	5.89E-09	3.29E-08	1.37E-07	4.60E-07	1.29E-06	3.16E-06	6.90E-06	1.37E-05	2.51E-05	4.31E-05	6.99E-05
145550	5.62E-10	1.34E-09	6.90E-09	4.34E-08	1.64E-07	5.21E-07	1.49E-06	3.32E-06	7.08E-06	1.39E-05	2.22E-05	3.31E-05
157235	1.95E-11	5.00E-11	3.80E-10	2.15E-09	9.11E-09	3.14E-08	9.13E-08	2.32E-07	5.27E-07	1.09E-06	2.08E-06	3.72E-06
162523	2.65E-11	7.01E-11	5.89E-10	3.42E-09	1.52E-08	5.44E-08	1.65E-07	4.32E-07	1.01E-06	2.14E-06	4.18E-06	7.63E-06
168123	1.91E-11	5.22E-11	4.60E-10	2.91E-09	1.37E-08	5.12E-08	1.41E-07	4.35E-07	1.05E-06	2.20E-06	4.54E-06	8.50E-06
168979	2.35E-11	6.44E-11	5.87E-10	3.60E-09	1.74E-08	6.54E-08	2.07E-07	5.65E-07	1.34E-06	2.90E-06	5.99E-06	1.12E-05
170443	2.35E-11	6.32E-11	6.07E-10	3.80E-09	1.84E-08	7.11E-08	2.27E-07	6.25E-07	1.52E-06	3.34E-06	6.70E-06	1.28E-05
184784	8.47E-12	2.54E-11	2.84E-10	2.13E-09	1.17E-08	4.99E-08	1.75E-07	5.24E-07	1.38E-06	3.25E-06	6.90E-06	1.30E-05
197742	2.03E-12	6.62E-12	8.76E-11	7.52E-10	4.82E-09	2.20E-08	6.42E-08	2.73E-07	7.60E-07	1.92E-06	4.34E-06	9.80E-06
210000	6.49E-14	2.27E-13	3.53E-12	3.66E-11	2.39E-10	1.25E-09	5.21E-09	1.81E-08	5.45E-08	1.64E-07	3.45E-07	7.52E-07
215730	8.20E-14	2.99E-13	5.00E-12	5.22E-11	3.80E-10	2.07E-09	9.01E-09	3.23E-08	1.01E-07	2.74E-07	7.60E-07	1.49E-06
220445	6.72E-14	2.52E-13	4.40E-12	4.93E-11	3.75E-10	2.12E-09	9.54E-09	3.54E-08	1.12E-07	3.13E-07	7.60E-07	1.77E-06
221450	8.11E-14	3.04E-13	5.51E-12	6.13E-11	4.70E-10	2.69E-09	1.21E-08	4.53E-08	1.45E-07	4.04E-07	1.01E-06	2.31E-06
219000	5.50E-13	2.07E-14	3.62E-13	3.92E-12	2.94E-11	1.65E-10	7.32E-10	2.60E-09	8.45E-09	2.34E-08	5.81E-08	1.31E-07
234000	1.77E-15	7.18E-15	1.53E-13	1.95E-12	1.60E-11	1.04E-10	5.21E-10	2.10E-09	7.15E-09	2.12E-08	5.60E-08	1.34E-07
246000	4.88E-16	2.13E-15	5.30E-14	7.70E-13	7.40E-12	5.13E-11	2.79E-10	1.19E-09	4.31E-09	1.35E-08	3.76E-08	9.41E-08
260000	1.20E-17	5.60E-17	1.70E-15	2.87E-14	3.14E-13	2.44E-12	1.43E-11	6.79E-11	2.64E-10	8.95E-10	2.61E-09	6.87E-09
265000	1.70E-17	8.30E-17	2.65E-15	4.73E-14	5.42E-13	4.37E-12	2.66E-11	1.29E-10	5.88E-10	1.79E-09	5.35E-09	1.44E-08
270500	1.24E-17	6.27E-17	2.19E-15	4.00E-14	4.92E-13	4.14E-12	2.62E-11	1.31E-10	5.42E-10	1.91E-09	5.80E-09	1.61E-08
271400	1.52E-17	7.71E-17	2.60E-15	5.13E-14	6.23E-13	5.20E-12	3.34E-11	1.69E-10	7.04E-10	2.49E-09	7.69E-09	2.11E-08
257000	5.43E-17	2.42E-16	7.54E-15	1.24E-13	1.31E-12	9.95E-12	5.74E-11	2.65E-10	1.02E-09	3.37E-09	9.81E-09	2.54E-08
271000	2.07E-17	1.05E-16	3.62E-15	6.92E-14	8.37E-13	7.08E-12	4.49E-11	2.24E-10	9.34E-10	3.30E-09	1.02E-08	2.80E-08
283000	5.72E-18	3.11E-17	1.24E-15	2.74E-14	3.70E-13	3.44E-12	2.37E-11	1.20E-10	5.45E-10	2.11E-09	6.95E-09	1.97E-08
304500	7.29E-19	4.52E-18	2.42E-16	6.65E-15	1.10E-13	1.21E-12	9.64E-12	5.92E-11	2.93E-10	1.21E-09	4.30E-09	1.34E-08
267000	6.94E-18	3.44E-17	1.13E-15	2.07E-14	2.41E-13	1.98E-12	1.22E-11	5.99E-11	2.93E-10	8.43E-10	2.56E-09	6.92E-09
281000	2.57E-18	1.30E-17	5.44E-16	1.16E-14	1.54E-13	1.41E-12	9.56E-12	5.10E-11	2.23E-10	8.26E-10	2.66E-09	7.50E-09
292000	6.24E-19	3.74E-18	2.15E-16	7.57E-15	5.59E-12	5.59E-12	3.70E-11	1.71E-10	4.77E-10	1.92E-09	5.73E-09	1.52E-08
313000	1.13E-19	7.39E-19	4.42E-17	1.33E-15	2.80E-13	2.37E-12	1.53E-11	7.93E-11	3.41E-10	1.42E-09	4.95E-09	1.46E-08
319000	5.19E-21	3.31E-20	2.27E-18	7.30E-17	1.30E-15	1.70E-14	1.00E-13	5.30E-12	2.30E-11	8.97E-11	3.46E-10	1.29E-09
349000	1.03E-22	6.32E-22	7.97E-20	3.56E-18	8.04E-16	1.30E-15	1.50E-14	1.20E-13	7.53E-13	3.04E-12	1.64E-11	6.07E-11

TABLE 51 (CONT.-1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C+

LEVEL	TEMPERATURE (DEG K)									
	10000	20000	32000	40000	44000	48000	0	0	0	0
0	2.84E-01	2.63E-01	2.42E-01	2.20E-01	1.79E-01	1.59E-01	0.	0.	0.	0.
44	5.67E-01	5.25E-01	4.82E-01	4.40E-01	3.94E-01	3.57E-01	0.	0.	0.	0.
43033	1.79E-01	1.74E-01	2.10E-01	2.55E-01	2.63E-01	2.63E-01	0.	0.	0.	0.
74322	1.59E-02	2.80E-02	4.16E-02	5.52E-02	6.74E-02	7.73E-02	0.	0.	0.	0.
90494	8.74E-04	1.89E-03	3.16E-03	4.67E-03	6.21E-03	7.63E-03	0.	0.	0.	0.
110453	1.12E-03	2.69E-03	5.01E-03	7.95E-03	1.12E-02	1.44E-02	0.	0.	0.	0.
142024	1.16E-04	3.54E-04	8.16E-04	1.51E-03	2.41E-03	3.44E-03	0.	0.	0.	0.
150464	1.72E-04	5.78E-04	1.40E-03	2.70E-03	4.53E-03	6.76E-03	0.	0.	0.	0.
168744	3.48E-05	1.35E-04	3.68E-04	7.80E-04	1.38E-03	2.16E-03	0.	0.	0.	0.
116538	2.63E-05	6.60E-04	1.28E-03	2.09E-03	3.02E-03	3.94E-03	0.	0.	0.	0.
131725	3.17E-04	9.08E-04	1.94E-03	3.42E-03	5.24E-03	7.24E-03	0.	0.	0.	0.
145550	2.31E-04	7.44E-04	1.74E-03	3.21E-03	5.32E-03	7.87E-03	0.	0.	0.	0.
157235	2.29E-05	8.14E-05	2.04E-04	4.12E-04	6.98E-04	1.05E-03	0.	0.	0.	0.
162323	5.01E-05	1.87E-04	4.87E-04	1.04E-03	1.73E-03	2.64E-03	0.	0.	0.	0.
162125	5.97E-05	2.33E-04	6.31E-04	1.31E-03	2.34E-03	3.67E-03	0.	0.	0.	0.
168979	7.93E-05	3.12E-04	8.50E-04	1.84E-03	3.20E-03	4.94E-03	0.	0.	0.	0.
170443	9.23E-05	3.69E-04	1.01E-03	2.17E-03	3.88E-03	6.41E-03	0.	0.	0.	0.
184784	1.19E-04	5.39E-04	1.61E-03	3.70E-03	7.00E-03	1.15E-02	0.	0.	0.	0.
197742	9.89E-05	4.58E-04	1.50E-03	3.47E-03	7.32E-03	1.25E-02	0.	0.	0.	0.
210000	8.72E-06	4.88E-05	1.73E-04	4.56E-04	9.42E-04	1.66E-03	0.	0.	0.	0.
215730	1.84E-05	1.09E-04	4.00E-04	1.07E-03	2.30E-03	4.18E-03	0.	0.	0.	0.
220465	2.33E-05	1.42E-04	5.39E-04	1.44E-03	3.23E-03	5.96E-03	0.	0.	0.	0.
221458	3.07E-05	1.90E-04	7.22E-04	1.94E-03	4.37E-03	8.08E-03	0.	0.	0.	0.
219000	1.70E-06	1.02E-05	3.84E-05	1.05E-04	2.27E-04	4.17E-04	0.	0.	0.	0.
234000	2.07E-06	1.42E-05	5.87E-05	1.72E-04	3.97E-04	7.64E-04	0.	0.	0.	0.
244000	1.64E-06	1.24E-05	5.70E-05	1.78E-04	4.30E-04	8.42E-04	0.	0.	0.	0.
260000	1.43E-07	1.25E-06	9.08E-06	2.03E-05	5.20E-05	1.07E-04	0.	0.	0.	0.
265000	3.23E-07	2.89E-06	1.44E-05	4.99E-05	1.30E-04	2.78E-04	0.	0.	0.	0.
270500	3.87E-07	3.43E-06	1.90E-05	6.48E-05	1.70E-04	3.87E-04	0.	0.	0.	0.
271400	5.13E-07	4.85E-06	2.55E-05	9.02E-05	2.41E-04	5.24E-04	0.	0.	0.	0.
287000	5.21E-07	4.34E-06	2.09E-05	6.87E-05	1.74E-04	3.91E-04	0.	0.	0.	0.
271000	6.75E-07	6.37E-06	3.34E-05	1.18E-04	3.15E-04	6.65E-04	0.	0.	0.	0.
293000	5.48E-07	5.73E-06	3.24E-05	1.23E-04	3.41E-04	7.71E-04	0.	0.	0.	0.
304500	4.84E-07	6.07E-06	3.65E-05	1.45E-04	3.83E-04	1.22E-03	0.	0.	0.	0.
287000	1.59E-07	1.45E-06	7.40E-06	2.58E-05	6.73E-05	1.45E-04	0.	0.	0.	0.
281000	2.04E-07	2.12E-06	1.18E-05	4.39E-05	1.22E-04	2.75E-04	0.	0.	0.	0.
292000	1.78E-07	2.00E-06	1.23E-05	4.71E-05	1.37E-04	3.19E-04	0.	0.	0.	0.
313000	1.61E-07	2.18E-06	1.50E-05	6.52E-05	2.86E-04	5.14E-04	0.	0.	0.	0.
319000	1.27E-08	1.28E-06	5.77E-06	1.87E-05	4.87E-05	4.75E-05	0.	0.	0.	0.
349000	3.73E-09	6.84E-08	5.95E-07	3.89E-06	1.13E-05	3.17E-05	0.	0.	0.	0.

TABLE 52. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF P+

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			1200	1600	2000	2400	2800	3200	3600	4000	4400	
2s 2p ¹ P ₁	0	1	1.23E-01	1.20E-01	1.18E-01	1.17E-01	1.16E-01	1.16E-01	1.15E-01	1.14E-01	1.14E-01	
	48	3	3.49E-01	3.45E-01	3.43E-01	3.41E-01	3.40E-01	3.39E-01	3.38E-01	3.37E-01	3.36E-01	
	130	7	5.27E-01	5.24E-01	5.23E-01	5.22E-01	5.21E-01	5.20E-01	5.19E-01	5.18E-01	5.17E-01	
	15316	5	4.53E-09	6.27E-07	9.71E-06	6.03E-05	2.22E-04	5.90E-04	1.24E-03	2.32E-03	3.81E-03	
	32689	1	1.17E-18	2.04E-14	7.25E-12	3.61E-10	5.09E-09	4.70E-08	2.44E-07	8.96E-07	2.60E-06	
2s 2p ³ P ₂	44785	5	5.00E-05	3.22E-19	1.43E-15	3.06E-13	2.11E-11	4.23E-10	4.25E-09	2.01E-08	1.29E-07	
	92245	15	11.43E-06	1.70E-36	2.69E-29	1.69E-24	4.33E-21	1.40E-18	1.60E-16	6.40E-15	1.34E-13	
	109218	9	0.	0.	0.03E-35	3.67E-29	4.93E-25	4.90E-22	1.14E-19	6.94E-16	3.17E-14	
	158127	3	0.	0.	0.	0.	8.30E-34	1.75E-31	4.09E-28	2.01E-25	3.19E-23	
	144188	5	0.	0.	0.	1.69E-30	3.94E-33	4.04E-29	5.40E-26	1.71E-23	1.90E-21	
2p ¹ P ₁	146766	3	0.	0.	0.	0.	2.12E-38	9.44E-34	3.91E-30	3.05E-27	7.09E-25	
	210000	9	0.	0.	0.	0.	0.	0.	1.50E-30	9.00E-29	1.13E-31	
	229000	5	0.	0.	0.	0.	0.	0.	0.	9.40E-37	1.72E-33	
	244000	1	0.	0.	0.	0.	0.	0.	0.	0.	3.67E-39	
	144056	12	0.	0.	0.	0.	7.40E-34	1.09E-29	1.05E-26	7.13E-24	9.29E-22	
2s 2p ³ P ₂	169022	36	0.	0.	0.	0.	7.90E-38	4.12E-33	1.90E-29	1.43E-26	4.07E-24	
	187693	60	0.	0.	0.	0.	0.	0.	1.82E-32	3.20E-29	1.51E-26	
	194955	12	0.	0.	0.	0.	0.	0.	6.99E-35	2.39E-31	1.44E-28	
	203304	36	0.	0.	0.	0.	0.	0.	2.07E-35	6.97E-32	5.37E-29	
	210284	50	0.	0.	0.	0.	0.	0.	2.10E-36	9.71E-33	9.37E-30	
2s 2p ¹ P ₁	211271	84	0.	0.	0.	0.	0.	0.	2.04E-36	9.53E-33	9.50E-30	
	207974	24	0.	0.	0.	0.	0.	0.	2.20E-36	8.62E-33	7.90E-30	
	224495	72	0.	0.	0.	0.	0.	0.	0.	3.47E-35	5.40E-32	
	244960	120	0.	0.	0.	0.	0.	0.	0.	8.70E-36	2.50E-34	
	246160	204	0.	0.	0.	0.	0.	0.	0.	0.	7.10E-37	
2s 2p ³ P ₂	252000	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	270000	60	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	280000	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	300000	320	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	323100	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	
2p ¹ P ₁	354000	192	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	380100	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	390000	64	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	421207	72	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	451291	128	0.	0.	0.	0.	0.	0.	0.	0.	0.	
2p ³ P ₂	471128	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	510002	320	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	561042	100	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	541277	192	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	439000											

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONITORED ENERGY LEVELS FROM MOORE (1949) AND ERIKSSON (1950)

TABLE 52 (CONT.-1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF H⁺

LEVEL (CM-1)	TEMPERATURE (DEG K)										
	4000	5200	5400	6000	6400	6800	7200	7600	8000	8400	9200
0	1.3E-01	1.1E-01	1.1E-01	1.1E-01	1.1E-01	1.1E-01	1.1E-01	1.1E-01	1.0E-01	1.0E-01	1.0E-01
48	3.3E-01	3.3E-01	3.3E-01	3.3E-01	3.3E-01	3.3E-01	3.3E-01	3.3E-01	3.2E-01	3.2E-01	3.1E-01
130	5.4E-01	5.4E-01	5.4E-01	5.4E-01	5.4E-01	5.4E-01	5.4E-01	5.4E-01	5.3E-01	5.3E-01	5.2E-01
13316	5.7E-03	8.1E-03	1.0E-02	1.4E-02	1.7E-02	2.1E-02	2.5E-02	3.0E-02	3.4E-02	3.9E-02	4.8E-02
32689	5.3E-06	1.3E-05	2.3E-05	4.1E-05	7.1E-05	1.0E-04	1.6E-04	2.2E-04	3.0E-04	4.0E-04	6.4E-04
44785	4.6E-07	1.3E-06	3.3E-06	7.3E-06	1.3E-05	2.7E-05	4.7E-05	7.8E-05	1.2E-04	1.7E-04	2.5E-04
92245	4.7E-12	1.3E-11	8.5E-11	4.1E-10	1.6E-09	5.5E-09	1.6E-08	4.2E-08	1.0E-07	2.2E-07	4.7E-07
102216	6.1E-15	7.6E-16	4.5E-15	4.2E-14	2.7E-13	1.7E-12	9.1E-12	4.3E-11	1.7E-10	7.3E-10	3.0E-09
155127	1.1E-21	7.7E-22	1.8E-21	2.3E-20	2.9E-19	3.6E-18	4.5E-17	5.7E-16	7.2E-15	9.3E-14	1.2E-12
144180	6.6E-20	2.6E-19	4.5E-18	5.3E-17	6.5E-16	7.9E-15	9.6E-14	1.2E-13	1.5E-12	1.9E-11	2.4E-10
166766	6.4E-23	3.0E-21	8.3E-20	1.4E-18	1.7E-17	1.5E-16	1.1E-15	6.9E-14	3.8E-13	1.2E-12	1.5E-12
218000	4.2E-29	6.7E-27	4.7E-25	1.9E-23	5.2E-22	9.2E-21	1.6E-19	1.6E-18	9.2E-17	5.2E-16	1.5E-15
229000	8.7E-31	1.7E-28	1.5E-26	7.9E-24	2.4E-22	5.0E-21	7.3E-20	8.1E-19	7.0E-18	5.0E-17	1.5E-16
244000	6.7E-34	2.1E-31	3.9E-29	3.5E-27	1.0E-25	6.1E-24	1.3E-22	2.6E-21	2.4E-20	1.9E-19	1.2E-18
149056	5.3E-20	1.6E-18	3.1E-17	4.0E-16	3.7E-15	2.6E-14	1.5E-13	7.3E-13	2.9E-12	1.0E-11	3.3E-11
169022	4.0E-23	1.9E-20	5.5E-19	1.0E-17	1.2E-16	1.7E-15	8.5E-14	5.0E-13	2.4E-12	3.0E-12	1.2E-11
187693	2.5E-24	1.0E-22	3.0E-21	1.0E-19	3.1E-18	3.7E-17	3.4E-16	2.3E-15	1.4E-14	3.0E-14	1.3E-13
196975	1.1E-26	2.9E-24	1.4E-22	4.1E-21	7.0E-20	1.0E-18	1.0E-17	8.2E-17	5.4E-16	2.9E-15	3.7E-15
203384	1.9E-28	1.4E-26	8.1E-24	2.6E-22	5.7E-20	8.1E-19	8.6E-18	7.4E-17	5.1E-16	2.9E-15	5.0E-15
210284	2.8E-27	3.6E-25	2.3E-23	8.4E-22	1.9E-20	3.1E-19	3.7E-18	3.2E-17	2.4E-16	1.4E-15	3.3E-15
211271	2.9E-27	3.8E-25	2.3E-23	9.3E-22	2.2E-20	3.9E-19	4.2E-18	3.2E-17	2.8E-16	1.7E-15	4.0E-15
207974	2.9E-27	2.7E-25	1.6E-23	5.8E-22	1.3E-20	2.8E-19	2.3E-18	2.0E-17	1.4E-16	8.7E-16	1.9E-15
224455	2.7E-29	4.9E-27	4.3E-25	2.1E-23	6.2E-22	1.8E-20	1.7E-19	1.9E-18	1.6E-17	1.1E-16	3.2E-15
244500	2.0E-31	5.4E-29	7.0E-27	4.6E-25	1.0E-23	4.5E-22	7.9E-21	1.0E-19	1.0E-18	8.4E-17	5.3E-16
264100	9.7E-34	4.5E-31	8.7E-29	6.3E-27	4.7E-25	1.5E-23	3.4E-22	5.3E-21	6.7E-20	8.7E-19	3.7E-17
292000	3.5E-33	1.1E-30	1.7E-28	1.2E-26	5.3E-25	1.9E-23	2.9E-22	4.1E-21	4.2E-20	3.0E-19	1.6E-17
270000	6.8E-35	2.4E-32	5.0E-30	3.1E-28	2.0E-26	1.0E-24	2.4E-23	4.1E-22	5.3E-21	5.3E-20	2.9E-18
280000	3.6E-37	2.7E-34	8.2E-32	1.1E-30	6.7E-28	3.8E-26	1.2E-24	2.8E-23	3.4E-22	4.0E-21	2.9E-19
309000	0.	2.1E-36	7.7E-34	1.9E-31	2.0E-29	1.2E-27	4.5E-26	1.8E-24	2.2E-23	3.4E-22	3.1E-20
323100	0.	0.	1.0E-35	2.7E-33	3.4E-31	2.4E-29	1.0E-27	3.2E-26	8.3E-25	1.0E-23	1.3E-21
354000	0.	0.	0.	2.4E-36	4.0E-34	5.3E-32	3.4E-30	1.4E-28	4.8E-27	8.2E-26	1.6E-25
368100	0.	3.8E-37	1.6E-34	3.3E-32	3.3E-30	1.9E-28	7.2E-27	1.8E-25	3.3E-24	4.7E-23	4.5E-21
339000	0.	0.	0.	8.7E-38	4.7E-35	4.2E-33	2.2E-31	8.9E-29	2.8E-28	3.6E-26	5.7E-25
3	0.000	0.	0.	9.9E-38	2.3E-35	2.0E-33	2.0E-31	9.3E-29	2.9E-28	3.6E-26	1.6E-25
394000	0.	0.	0.	0.	0.	5.7E-36	6.8E-34	3.0E-32	1.6E-30	4.0E-27	1.7E-26
390000	0.	0.	0.	0.	1.9E-36	2.4E-34	1.3E-32	1.1E-30	4.0E-29	1.0E-27	2.9E-25
412000	0.	0.	0.	0.	0.	4.9E-37	6.1E-35	4.4E-33	7.8E-31	1.9E-28	3.5E-27
460000	0.	0.	0.	0.	0.	1.8E-37	4.4E-35	3.7E-33	1.4E-31	5.2E-28	1.2E-27
439000	0.	0.	0.	0.	0.	0.	1.6E-37	1.5E-35	1.0E-33	4.9E-32	1.3E-30

TABLE 52 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS BY n

LEVEL (n)	TEMPERATURE (°K)									
	9400	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.04E-01	1.04E-01	1.04E-01	1.03E-01	1.01E-01	9.97E-02	9.83E-02	9.69E-02	9.55E-02	9.41E-02
40	3.17E-01	3.17E-01	3.17E-01	3.02E-01	2.82E-01	2.60E-01	2.37E-01	2.14E-01	1.91E-01	1.68E-01
130	5.22E-01	5.19E-01	5.12E-01	4.95E-01	4.76E-01	4.55E-01	4.32E-01	4.08E-01	3.84E-01	3.60E-01
15316	5.04E-02	5.04E-02	5.04E-02	4.91E-02	4.76E-02	4.60E-02	4.43E-02	4.26E-02	4.09E-02	3.92E-02
32409	7.93E-04	7.93E-04	7.93E-04	7.71E-04	7.47E-04	7.22E-04	6.97E-04	6.72E-04	6.47E-04	6.22E-04
44705	4.79E-04	4.79E-04	4.79E-04	4.62E-04	4.43E-04	4.23E-04	4.02E-04	3.81E-04	3.60E-04	3.39E-04
92245	1.38E-06	1.38E-06	1.38E-06	1.34E-06	1.29E-06	1.24E-06	1.19E-06	1.14E-06	1.09E-06	1.04E-06
193118	7.53E-08	7.53E-08	7.53E-08	7.34E-08	7.14E-08	6.94E-08	6.74E-08	6.54E-08	6.34E-08	6.14E-08
193127	2.58E-11	2.58E-11	2.58E-11	2.52E-11	2.46E-11	2.40E-11	2.34E-11	2.28E-11	2.22E-11	2.16E-11
164186	2.19E-10	2.19E-10	2.19E-10	2.14E-10	2.08E-10	2.02E-10	1.96E-10	1.90E-10	1.84E-10	1.78E-10
144764	4.46E-12	4.46E-12	4.46E-12	4.36E-12	4.26E-12	4.16E-12	4.06E-12	3.96E-12	3.86E-12	3.76E-12
210000	2.27E-14	2.27E-14	2.27E-14	2.22E-14	2.16E-14	2.10E-14	2.04E-14	1.98E-14	1.92E-14	1.86E-14
220000	6.12E-16	6.12E-16	6.12E-16	6.02E-16	5.92E-16	5.82E-16	5.72E-16	5.62E-16	5.52E-16	5.42E-16
264000	6.97E-19	6.97E-19	6.97E-19	6.87E-19	6.77E-19	6.67E-19	6.57E-19	6.47E-19	6.37E-19	6.27E-19
149056	2.54E-10	2.54E-10	2.54E-10	2.49E-10	2.43E-10	2.37E-10	2.31E-10	2.25E-10	2.19E-10	2.13E-10
169022	3.02E-11	3.02E-11	3.02E-11	2.97E-11	2.91E-11	2.85E-11	2.79E-11	2.73E-11	2.67E-11	2.61E-11
187693	3.08E-12	3.08E-12	3.08E-12	3.03E-12	2.97E-12	2.91E-12	2.85E-12	2.79E-12	2.73E-12	2.67E-12
194955	1.93E-13	1.93E-13	1.93E-13	1.88E-13	1.82E-13	1.76E-13	1.70E-13	1.64E-13	1.58E-13	1.52E-13
203304	2.21E-13	2.21E-13	2.21E-13	2.16E-13	2.10E-13	2.04E-13	1.98E-13	1.92E-13	1.86E-13	1.80E-13
210204	1.31E-13	1.31E-13	1.31E-13	1.26E-13	1.20E-13	1.14E-13	1.08E-13	1.02E-13	9.6E-14	9.0E-14
211271	1.59E-13	1.59E-13	1.59E-13	1.54E-13	1.48E-13	1.42E-13	1.36E-13	1.30E-13	1.24E-13	1.18E-13
224454	1.39E-14	1.39E-14	1.39E-14	1.34E-14	1.28E-14	1.22E-14	1.16E-14	1.10E-14	1.04E-14	9.8E-15
244500	1.54E-15	1.54E-15	1.54E-15	1.49E-15	1.43E-15	1.37E-15	1.31E-15	1.25E-15	1.19E-15	1.13E-15
260100	1.95E-16	1.95E-16	1.95E-16	1.90E-16	1.84E-16	1.78E-16	1.72E-16	1.66E-16	1.60E-16	1.54E-16
252000	8.42E-17	8.42E-17	8.42E-17	8.32E-17	8.22E-17	8.12E-17	8.02E-17	7.92E-17	7.82E-17	7.72E-17
270000	1.70E-17	1.70E-17	1.70E-17	1.65E-17	1.59E-17	1.53E-17	1.47E-17	1.41E-17	1.35E-17	1.29E-17
280000	1.91E-18	1.91E-18	1.91E-18	1.86E-18	1.80E-18	1.74E-18	1.68E-18	1.62E-18	1.56E-18	1.50E-18
300000	2.38E-19	2.38E-19	2.38E-19	2.33E-19	2.27E-19	2.21E-19	2.15E-19	2.09E-19	2.03E-19	1.97E-19
323100	1.07E-20	1.07E-20	1.07E-20	1.02E-20	9.6E-21	9.0E-21	8.4E-21	7.8E-21	7.2E-21	6.6E-21
354000	1.43E-22	1.43E-22	1.43E-22	1.38E-22	1.32E-22	1.26E-22	1.20E-22	1.14E-22	1.08E-22	1.02E-22
380100	3.38E-20	3.38E-20	3.38E-20	3.33E-20	3.27E-20	3.21E-20	3.15E-20	3.09E-20	3.03E-20	2.97E-20
330000	5.28E-21	5.28E-21	5.28E-21	5.23E-21	5.17E-21	5.11E-21	5.05E-21	4.99E-21	4.93E-21	4.87E-21
340000	1.34E-23	1.34E-23	1.34E-23	1.30E-23	1.24E-23	1.18E-23	1.12E-23	1.06E-23	1.00E-23	9.4E-24
360000	2.26E-25	2.26E-25	2.26E-25	2.21E-25	2.15E-25	2.09E-25	2.03E-25	1.97E-25	1.91E-25	1.85E-25
390000	3.53E-24	3.53E-24	3.53E-24	3.48E-24	3.42E-24	3.36E-24	3.30E-24	3.24E-24	3.18E-24	3.12E-24
412000	5.19E-26	5.19E-26	5.19E-26	5.14E-26	5.08E-26	5.02E-26	4.96E-26	4.90E-26	4.84E-26	4.78E-26
400000	3.19E-24	3.19E-24	3.19E-24	3.14E-24	3.08E-24	3.02E-24	2.96E-24	2.90E-24	2.84E-24	2.78E-24
430000	5.45E-28	5.45E-28	5.45E-28	5.40E-28	5.34E-28	5.28E-28	5.22E-28	5.16E-28	5.10E-28	5.04E-28

TABLE 52 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF H₂

LEVEL	TEMPERATURE (DEG K)									
	10000	20000	28000	32000	36000	40000	44000	48000	0	0
0	8.72E-02	8.29E-02	7.87E-02	7.45E-02	7.03E-02	6.61E-02	6.19E-02	5.77E-02	0.	0.
48	2.61E-01	2.48E-01	2.36E-01	2.23E-01	2.10E-01	1.97E-01	1.84E-01	1.71E-01	0.	0.
130	4.32E-01	4.12E-01	3.91E-01	3.70E-01	3.49E-01	3.28E-01	3.07E-01	2.86E-01	0.	0.
15316	1.74E-01	1.69E-01	1.64E-01	1.59E-01	1.54E-01	1.49E-01	1.44E-01	1.39E-01	0.	0.
32489	1.23E-02	1.55E-02	1.81E-02	2.02E-02	2.22E-02	2.42E-02	2.62E-02	2.82E-02	0.	0.
46705	2.44E-02	3.74E-02	4.80E-02	5.74E-02	6.58E-02	7.32E-02	8.06E-02	8.80E-02	0.	0.
92245	1.61E-01	1.48E-01	1.35E-01	1.22E-01	1.09E-01	9.6E-02	8.3E-02	7.0E-02	0.	0.
108218	1.12E-03	1.28E-03	1.44E-03	1.60E-03	1.76E-03	1.92E-03	2.08E-03	2.24E-03	0.	0.
135127	2.39E-03	2.59E-03	2.79E-03	2.99E-03	3.19E-03	3.39E-03	3.59E-03	3.79E-03	0.	0.
144188	7.68E-05	2.51E-04	6.02E-04	1.17E-03	1.95E-03	2.93E-03	4.11E-03	5.49E-03	0.	0.
166766	1.19E-05	4.72E-05	1.31E-04	2.85E-04	5.22E-04	8.40E-04	1.22E-03	1.66E-03	0.	0.
210000	1.64E-06	1.02E-05	3.97E-05	1.10E-04	2.48E-04	4.72E-04	7.90E-04	1.16E-03	0.	0.
229000	4.74E-07	3.21E-06	1.71E-05	3.95E-05	9.27E-05	1.83E-04	3.16E-04	5.00E-04	0.	0.
264000	1.17E-06	1.04E-07	5.91E-07	1.95E-06	5.26E-06	1.14E-05	2.21E-05	3.80E-05	0.	0.
169056	1.38E-04	4.49E-04	1.14E-03	2.31E-03	3.95E-03	5.99E-03	8.32E-03	1.10E-02	0.	0.
169022	1.25E-04	5.04E-04	1.42E-03	3.12E-03	5.77E-03	9.34E-03	1.37E-02	1.91E-02	0.	0.
187933	4.79E-05	3.22E-04	1.02E-03	2.47E-03	4.91E-03	8.47E-03	1.31E-02	1.88E-02	0.	0.
196955	1.74E-06	4.00E-05	1.00E-04	3.41E-04	7.64E-04	1.25E-03	1.88E-03	2.66E-03	0.	0.
203384	1.59E-05	8.83E-05	3.02E-04	7.91E-04	1.80E-03	3.84E-03	6.99E-03	1.17E-02	0.	0.
210284	1.75E-05	1.01E-04	3.70E-04	1.00E-03	2.18E-03	4.05E-03	6.53E-03	9.66E-03	0.	0.
211271	2.31E-05	1.34E-04	4.92E-04	1.35E-03	2.95E-03	5.49E-03	9.02E-03	1.34E-02	0.	0.
207974	8.05E-06	4.54E-05	1.64E-04	4.59E-04	9.40E-04	1.75E-03	2.84E-03	4.30E-03	0.	0.
226425	7.90E-06	5.27E-05	2.15E-04	6.29E-04	1.46E-03	2.84E-03	4.90E-03	7.74E-03	0.	0.
244500	4.51E-06	3.48E-05	1.90E-04	5.10E-04	1.27E-03	2.44E-03	4.70E-03	7.17E-03	0.	0.
264100	3.95E-06	3.07E-05	1.92E-04	6.80E-04	1.87E-03	4.10E-03	7.97E-03	1.27E-02	0.	0.
253000	4.79E-07	3.94E-06	1.89E-05	4.30E-05	1.42E-04	3.42E-04	6.34E-04	1.00E-03	0.	0.
270000	4.09E-07	4.09E-06	2.52E-05	9.20E-05	2.55E-04	5.74E-04	1.11E-03	1.88E-03	0.	0.
280000	2.77E-07	3.10E-06	1.87E-05	7.97E-05	2.22E-04	5.31E-04	1.09E-03	1.79E-03	0.	0.
300000	2.40E-07	3.44E-06	2.25E-05	1.00E-04	3.44E-04	8.34E-04	1.79E-03	3.00E-03	0.	0.
323100	3.64E-08	5.31E-07	4.17E-06	1.90E-05	6.78E-05	1.82E-04	4.60E-04	8.60E-04	0.	0.
354000	9.69E-09	1.92E-07	1.70E-06	9.93E-06	3.06E-05	1.13E-04	2.79E-04	5.41E-04	0.	0.
368100	2.99E-08	3.97E-07	2.75E-06	1.20E-05	3.88E-05	9.91E-05	2.12E-04	3.95E-04	0.	0.
319000	7.94E-09	1.39E-07	1.17E-06	6.03E-06	2.21E-05	6.25E-05	1.44E-04	2.66E-04	0.	0.
344000	2.69E-09	4.49E-08	4.42E-07	2.50E-06	1.04E-05	3.19E-05	7.94E-05	1.44E-04	0.	0.
364000	5.44E-10	1.54E-08	1.04E-07	1.20E-06	5.04E-06	1.99E-05	5.41E-05	1.27E-04	0.	0.
340000	2.00E-09	4.94E-08	5.30E-07	3.40E-06	1.44E-05	4.72E-05	1.23E-04	2.24E-04	0.	0.
412000	5.23E-10	1.70E-08	2.27E-07	1.40E-06	6.21E-06	2.95E-05	8.37E-05	1.57E-04	0.	0.
460000	2.25E-10	7.03E-09	9.17E-08	6.64E-07	3.80E-06	1.13E-05	3.19E-05	7.32E-05	0.	0.
459000	6.22E-11	2.34E-09	4.05E-08	4.05E-08	1.87E-06	7.32E-06	2.24E-05	5.41E-05	0.	0.

TABLE 53. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O⁺

STATE	LEVEL (cm ⁻¹)	STAT. WT.	TEMPERATURE (DEG K)									
			1200	1500	2000	2400	2750	3200	3600	4000	4400	4600
2p ² 3p ²	0	4	1.00E 20	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
	26019	10	2.71E-14	0.40E-11	1.04E-06	2.68E-07	1.49E-05	5.35E-05	1.42E-04	3.61E-04	1.00E 00	1.00E 00
	40447	6	1.27E-21	2.36E-16	3.41E-13	4.37E-11	1.40E-09	1.60E-08	1.42E-07	7.15E-07	1.00E 00	1.00E 00
	119933	12	0.	0.	1.02E-37	1.70E-31	5.10E-27	1.14E-23	4.57E-20	2.32E-19	7.78E-17	1.00E 00
2p ² 3p ² 3d	169991	10	0.	0.	0.	0.	2.20E-37	9.60E-33	3.86E-28	2.74E-26	6.68E-24	1.00E 00
	199710	2	0.	0.	0.	0.	0.	3.04E-39	5.24E-35	1.34E-31	2.04E-29	1.00E 00
	212450	6	0.	0.	0.	0.	0.	0.	1.55E-37	4.80E-34	9.40E-31	1.00E 00
	317400	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
2p ² 3p ² 3d ²	186404	18	0.	0.	0.	0.	0.	1.44E-36	1.44E-32	3.12E-29	1.42E-26	1.00E 00
	209280	54	0.	0.	0.	0.	0.	0.	6.57E-32	1.81E-32	2.63E-29	1.00E 00
	232343	90	0.	0.	0.	0.	0.	0.	0.	1.55E-35	2.11E-32	1.00E 00
	239246	18	0.	0.	0.	0.	0.	0.	0.	1.65E-37	4.40E-34	1.00E 00
(D) 3p ² 3d ²	246000	54	0.	0.	0.	0.	0.	0.	0.	0.	1.37E-35	1.00E 00
	255006	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	259532	126	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	266972	10	0.	0.	0.	0.	0.	0.	2.97E-36	1.74E-32	1.01E-29	1.00E 00
(S) 3p ² 3d ²	220090	30	0.	0.	0.	0.	0.	0.	0.	1.55E-32	1.00E 00	1.00E 00
	232571	50	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	272/280	140	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	226051	2	0.	0.	0.	0.	0.	0.	0.	1.64E-36	3.74E-33	1.00E 00
2p ² 3p ² 3d ² 3f	250251	6	0.	0.	0.	0.	0.	0.	0.	0.	4.33E-36	1.00E 00
	279551	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	290000	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	281000	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
(D) 3p ² 3d ² 3f	313000	160	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	42.1535	270	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	44.2449	400	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	47.4847	450	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
2p ² 3p ² 3d ² 3f ²	437000	54	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	54.1797	550	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	64.2059	750	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
	534000	750	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
UNSTANDARD ENERGY LEVELS FROM MOORE (1949) AND ERIKSSON (1961)

TABLE 53 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O⁺

LEVEL (CR-1)	TEMPERATURE (DEG K)									
	4000	5200	5400	6000	6400	6800	7000	8000	8400	9200
0	9.99E-01	9.90E-01	9.87E-01	9.94E-01	9.94E-01	9.91E-01	9.80E-01	9.79E-01	9.74E-01	9.61E-01
24019	0.04E-04	1.49E-03	2.54E-03	0.01E-03	5.90E-03	1.16E-03	1.16E-03	1.97E-02	3.02E-02	3.62E-02
40047	0.09E-06	2.05E-05	4.57E-05	9.12E-05	2.04E-04	4.56E-04	6.95E-04	1.01E-03	1.43E-03	2.57E-03
119333	7.31E-16	1.14E-14	1.24E-13	9.64E-13	5.82E-12	2.34E-11	1.14E-10	1.24E-09	3.50E-09	2.50E-08
169991	6.15E-22	2.82E-20	7.50E-19	1.24E-17	1.54E-16	1.30E-15	9.70E-15	2.65E-13	1.00E-12	1.20E-11
195710	1.64E-26	1.52E-24	7.25E-23	2.07E-21	3.00E-20	5.14E-19	3.99E-17	2.53E-16	1.35E-15	2.45E-14
212690	3.11E-28	4.19E-26	2.00E-24	1.07E-22	2.90E-21	5.20E-19	4.95E-18	2.22E-16	1.15E-15	5.20E-15
317400	0.	1.00E-36	5.74E-34	1.32E-33	1.53E-31	1.01E-29	4.22E-28	2.30E-25	3.50E-24	3.99E-22
184404	2.30E-24	1.70E-22	6.77E-21	1.49E-19	2.70E-18	3.10E-17	2.04E-16	1.17E-14	5.74E-14	9.14E-13
209200	7.04E-27	9.70E-25	6.10E-23	2.19E-21	5.93E-20	7.90E-19	9.37E-17	6.03E-16	3.60E-15	1.02E-14
232343	1.19E-29	2.54E-27	2.52E-25	1.33E-23	4.40E-22	9.50E-21	1.44E-19	1.51E-17	1.10E-16	6.60E-16
239346	3.12E-31	7.79E-29	6.01E-27	3.31E-25	1.91E-23	4.52E-22	7.51E-21	9.20E-20	6.07E-18	2.40E-16
244006	9.04E-32	2.92E-29	3.04E-27	2.63E-25	1.04E-23	2.77E-22	5.02E-21	6.91E-19	5.09E-18	3.07E-17
259006	1.43E-32	5.11E-30	7.09E-28	6.21E-26	2.03E-24	6.23E-23	1.64E-21	2.39E-20	2.34E-18	1.70E-17
259132	1.52E-32	5.54E-30	8.71E-28	6.97E-26	3.22E-24	9.40E-23	1.91E-21	3.16E-19	2.01E-18	1.25E-16
266972	2.09E-27	3.34E-25	2.01E-23	6.94E-22	1.54E-20	2.37E-19	2.69E-18	2.37E-17	9.70E-16	2.11E-14
229990	0.05E-30	1.77E-27	1.67E-25	0.93E-24	2.67E-22	5.57E-21	9.20E-20	0.11E-18	5.70E-17	1.75E-15
252571	1.05E-32	5.57E-30	8.19E-28	6.19E-26	2.72E-24	7.44E-23	1.49E-21	2.29E-19	1.90E-18	1.01E-17
272930	1.00E-34	6.30E-32	1.40E-29	1.50E-27	6.94E-26	3.30E-24	1.33E-23	1.00E-20	1.04E-19	1.01E-17
224051	1.47E-30	2.75E-28	2.43E-26	1.10E-24	3.53E-23	7.07E-22	1.01E-20	9.34E-19	6.49E-18	3.77E-17
262231	3.07E-33	1.27E-30	1.70E-28	1.30E-26	5.50E-25	1.50E-23	2.04E-22	4.17E-20	3.54E-19	1.45E-17
279921	2.90E-36	1.73E-33	4.03E-31	4.35E-29	2.04E-27	1.09E-25	2.70E-24	6.04E-22	7.23E-21	6.39E-19
290000	0.	2.16E-35	7.44E-33	1.19E-30	1.00E-28	5.01E-27	1.42E-25	5.99E-23	7.44E-22	6.07E-20
313000	0.	3.05E-33	9.92E-31	1.22E-28	8.21E-27	3.37E-25	9.12E-24	2.94E-23	2.74E-20	1.70E-18
	0.	9.77E-37	4.74E-34	1.01E-31	1.10E-29	6.04E-28	2.71E-26	1.40E-23	2.03E-22	2.12E-20
340000	0.	0.	7.77E-37	2.62E-34	4.20E-32	3.02E-30	2.07E-28	1.04E-25	3.33E-24	3.24E-22
373000	0.	0.	0.	0.	4.54E-35	6.31E-33	5.04E-31	0.43E-28	2.90E-26	3.39E-24
383000	0.	0.	0.	0.	4.51E-36	7.15E-34	6.41E-32	1.34E-28	3.54E-26	1.00E-24
437000	0.	0.	0.	0.	0.	0.	1.61E-36	1.50E-34	1.24E-29	2.74E-28
534000	0.	0.	0.	0.	0.	0.	0.	0.	2.19E-36	9.70E-35

TABLE 53 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O-

LEVEL (cm ⁻¹)	TEMPERATURE (DEG K)									
	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	9.54E-01	9.44E-01	9.24E-01	8.99E-01	8.73E-01	8.44E-01	8.12E-01	7.81E-01	7.50E-01	7.19E-01
26017	4.28E-02	4.96E-02	6.92E-02	9.02E-02	1.12E-01	1.34E-01	1.56E-01	1.77E-01	2.00E-01	2.21E-01
46049	3.32E-03	4.20E-03	6.97E-03	1.02E-02	1.49E-02	2.13E-02	2.93E-02	3.92E-02	5.09E-02	6.45E-02
119033	4.57E-06	9.10E-06	4.24E-07	1.53E-06	4.50E-06	1.13E-05	2.40E-05	4.92E-05	8.66E-05	1.52E-04
169991	3.74E-11	1.00E-10	8.60E-10	5.11E-09	2.70E-09	8.25E-09	2.49E-07	6.51E-06	1.51E-05	3.20E-05
192710	8.71E-14	2.79E-13	3.93E-12	2.90E-11	1.71E-10	7.70E-10	2.80E-09	9.00E-09	2.42E-08	5.94E-08
212450	2.04E-14	7.32E-14	1.15E-12	1.16E-11	7.87E-11	4.09E-10	1.70E-09	5.00E-09	1.42E-08	3.85E-07
317400	3.13E-21	2.02E-20	1.29E-18	6.00E-17	7.24E-16	8.65E-15	7.36E-14	4.73E-13	2.17E-12	1.06E-11
186604	3.07E-12	9.51E-12	1.04E-10	7.77E-10	4.22E-09	1.79E-08	6.21E-08	1.84E-07	4.70E-07	1.11E-06
204200	3.11E-13	1.00E-12	1.63E-11	1.55E-10	1.04E-09	5.25E-09	2.13E-08	7.22E-08	2.11E-07	5.92E-07
235653	1.56E-14	6.23E-14	1.20E-12	1.57E-11	1.30E-10	7.93E-10	3.70E-09	1.47E-08	4.07E-08	1.42E-07
239348	1.13E-15	4.71E-15	1.05E-13	1.39E-12	1.23E-11	7.90E-11	3.94E-10	1.60E-09	5.49E-09	1.63E-08
244340	1.10E-15	4.80E-15	1.10E-13	1.70E-12	1.61E-11	1.10E-10	5.79E-10	2.44E-09	8.72E-09	2.69E-08
258004	5.01E-16	2.40E-15	6.79E-14	1.07E-12	1.09E-11	7.00E-11	4.39E-10	1.94E-09	7.29E-09	2.34E-08
259432	6.09E-16	3.03E-15	8.43E-14	1.33E-12	1.37E-11	1.01E-10	5.62E-10	2.32E-09	9.44E-09	3.04E-08
286972	8.05E-14	2.76E-13	4.04E-12	3.75E-11	2.44E-10	1.22E-09	4.09E-09	1.43E-08	4.72E-08	1.21E-07
289906	7.77E-15	3.04E-14	6.04E-13	7.21E-12	3.48E-11	1.43E-10	1.63E-09	6.24E-09	2.03E-08	5.00E-08
292371	4.32E-14	1.94E-13	5.19E-12	7.93E-12	7.90E-11	5.44E-11	3.00E-10	1.35E-09	4.98E-09	1.50E-08
272330	6.36E-17	3.34E-16	1.14E-14	2.21E-13	2.64E-12	2.23E-11	1.40E-10	6.94E-10	3.04E-09	1.02E-08
226051	6.10E-16	3.10E-15	6.00E-14	6.52E-13	5.45E-12	3.17E-11	1.45E-10	5.76E-10	1.76E-09	5.99E-09
290251	7.36E-17	3.27E-16	8.44E-15	1.26E-13	1.23E-12	8.59E-12	4.62E-11	2.00E-10	7.27E-10	2.20E-09
279951	2.61E-18	1.35E-17	4.00E-16	9.61E-15	1.19E-13	1.02E-12	6.54E-12	3.31E-11	1.30E-10	4.07E-10
286000	4.13E-19	2.42E-18	1.13E-16	2.70E-15	4.14E-14	4.36E-13	3.04E-12	1.74E-11	8.07E-11	3.14E-10
281000	1.10E-17	5.00E-17	2.27E-15	4.72E-14	6.12E-13	5.97E-12	3.63E-11	1.89E-10	8.60E-10	3.92E-09
313000	1.62E-19	1.05E-18	6.13E-17	1.01E-15	3.15E-14	3.62E-13	2.99E-12	1.89E-11	9.57E-11	4.02E-10
340000	4.77E-21	3.63E-20	3.03E-18	1.20E-16	2.60E-15	3.01E-14	3.79E-13	2.01E-12	1.44E-11	7.04E-11
379000	6.93E-23	5.40E-22	7.10E-20	4.00E-18	1.23E-16	2.20E-15	2.04E-14	5.57E-13	7.99E-12	9.99E-11
383000	1.26E-23	1.24E-22	1.62E-20	1.15E-18	3.83E-17	7.64E-16	1.02E-14	9.04E-14	7.20E-13	4.21E-12
437000	4.72E-27	6.42E-26	1.91E-23	2.17E-21	1.19E-19	3.44E-18	7.03E-17	9.11E-15	4.10E-14	8.42E-13
594000	3.12E-33	7.61E-32	8.95E-29	2.83E-26	3.52E-24	2.32E-22	8.73E-21	2.67E-19	3.30E-18	2.69E-15

TABLE 53 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O⁺

LEVEL	(CM ⁻¹)	TEMPERATURE (DEG K)									
		24000	26000	32000	34000	40000	44000	48000	0	0	0
6		6.11E-01	5.48E-01	4.97E-01	4.55E-01	4.19E-01	3.84E-01	3.55E-01	0.	0.	0.
24817		3.04E-01	3.45E-01	3.72E-01	3.96E-01	4.02E-01	4.02E-01	3.97E-01	0.	0.	0.
40447		6.0E-02	1.03E-01	1.21E-01	1.34E-01	1.47E-01	1.54E-01	1.56E-01	0.	0.	0.
119933		1.38E-03	3.44E-03	6.79E-03	1.13E-02	1.68E-02	2.29E-02	2.92E-02	0.	0.	0.
169991		7.29E-05	2.71E-04	7.13E-03	1.50E-03	2.07E-03	2.24E-03	2.13E-03	0.	0.	0.
199710		2.45E-04	1.17E-05	3.75E-05	9.13E-05	1.64E-04	3.21E-04	5.03E-04	0.	0.	0.
212650		2.67E-04	1.40E-05	3.25E-05	1.39E-04	3.80E-04	5.33E-04	6.80E-04	0.	0.	0.
317400		5.00E-05	6.78E-06	4.73E-07	2.11E-06	6.92E-06	1.80E-05	3.93E-05	0.	0.	0.
186404		3.81E-05	1.67E-04	5.08E-04	1.10E-03	2.29E-03	3.89E-03	5.95E-03	0.	0.	0.
209208		2.92E-05	1.59E-04	5.52E-04	1.44E-03	3.05E-03	5.57E-03	9.04E-03	0.	0.	0.
232543		1.21E-05	7.94E-05	3.22E-04	9.41E-04	2.20E-03	4.33E-03	7.50E-03	0.	0.	0.
239348		1.61E-04	1.12E-05	4.74E-05	1.44E-04	3.44E-04	6.92E-04	1.22E-03	0.	0.	0.
244540		3.09E-04	2.20E-05	1.01E-04	3.19E-04	7.83E-04	1.63E-03	2.93E-03	0.	0.	0.
285806		3.14E-04	2.51E-05	1.17E-04	3.84E-04	9.79E-04	2.04E-03	3.63E-03	0.	0.	0.
253932		4.10E-04	3.35E-05	1.57E-04	4.10E-04	1.33E-03	2.82E-03	5.21E-03	0.	0.	0.
206972		6.24E-04	3.29E-05	1.13E-04	2.91E-04	6.12E-04	1.11E-03	1.79E-03	0.	0.	0.
239898		4.74E-04	3.04E-05	1.21E-04	3.49E-04	8.05E-04	1.57E-03	2.71E-03	0.	0.	0.
252571		2.03E-04	1.58E-05	7.27E-05	2.35E-04	5.94E-04	1.25E-03	2.29E-03	0.	0.	0.
272930		1.92E-04	1.78E-05	9.31E-05	3.33E-04	9.14E-04	2.04E-03	3.90E-03	0.	0.	0.
224851		3.79E-07	2.37E-06	9.24E-06	2.63E-05	5.99E-05	1.34E-04	1.90E-04	0.	0.	0.
250251		2.89E-07	2.14E-06	9.10E-06	3.10E-05	7.75E-05	1.62E-04	2.94E-04	0.	0.	0.
275951		9.99E-08	9.51E-07	5.68E-06	1.89E-05	5.12E-05	1.14E-04	2.27E-04	0.	0.	0.
284000		9.41E-08	1.09E-06	4.40E-06	2.66E-05	7.07E-05	1.93E-04	3.90E-04	0.	0.	0.
281000		6.84E-07	4.60E-06	3.44E-05	1.34E-04	3.84E-04	8.84E-04	1.74E-03	0.	0.	0.
313000		1.73E-07	2.27E-06	1.54E-05	6.72E-05	2.16E-04	5.54E-04	1.25E-03	0.	0.	0.
340000		5.80E-08	9.54E-07	7.70E-06	3.80E-05	1.30E-04	3.87E-04	8.90E-04	0.	0.	0.
373000		1.43E-08	3.12E-07	3.11E-06	1.83E-05	7.45E-05	2.34E-04	5.94E-04	0.	0.	0.
383000		7.34E-09	1.75E-07	1.84E-06	1.15E-05	4.00E-05	1.50E-04	4.13E-04	0.	0.	0.
437000		3.52E-10	1.33E-08	2.00E-07	1.63E-06	8.59E-06	3.30E-05	9.99E-05	0.	0.	0.
534000		1.43E-12	1.24E-10	3.40E-09	4.60E-08	3.58E-07	1.84E-06	7.44E-06	0.	0.	0.

TABLE 54. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar*

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				1200	1600	2000	2400	2800	3200	3600	4000	4400	
3s 3p 1P ₁ ^o	0	0.	4	9.18E-01	8.79E-01	8.49E-01	8.25E-01	8.07E-01	7.92E-01	7.80E-01	7.70E-01	7.62E-01	
	1432	0.1775	2	8.24E-02	1.21E-01	1.51E-01	1.75E-01	1.93E-01	2.08E-01	2.20E-01	2.30E-01	2.38E-01	
	108723	13.4796	2	0.	0.	4.54E-35	2.04E-29	2.20E-25	2.35E-22	2.52E-20	2.70E-18	1.30E-16	
	3s 3p 3P ^o	16.4245	20	0.	0.	0.	1.33E-34	1.10E-29	5.36E-24	3.95E-23	7.70E-21	5.85E-19	
	3s 3p 3d other	18.1408	70	0.	0.	0.	1.10E-37	3.14E-32	3.72E-28	5.47E-25	1.67E-22	2.22E-20	
(D) 3d	136028	16.8649	18	0.	0.	0.	1.42E-35	1.60E-30	9.77E-27	8.60E-24	1.99E-21	1.65E-19	
	138023	19.5918	54	0.	0.	0.	0.	5.92E-35	3.93E-30	3.93E-27	2.14E-24	3.72E-22	
	186493	23.1466	90	0.	0.	0.	0.	0.	6.25E-34	6.01E-32	1.10E-28	5.24E-26	
	195547	24.2464	126	0.	0.	0.	0.	0.	1.42E-37	2.79E-33	6.83E-30	4.04E-27	
	184082	20.3431	50	0.	0.	0.	0.	2.43E-34	9.03E-32	3.23E-28	2.25E-25	4.75E-23	
(5) 3d	148754	18.4427	10	0.	0.	0.	0.	1.20E-33	1.78E-29	2.95E-24	1.11E-23	1.43E-21	
	171831	21.3038	30	0.	0.	0.	0.	0.	1.64E-33	8.75E-30	8.30E-27	2.74E-24	
	148457	24.7537	50	0.	0.	0.	0.	0.	0.	2.14E-34	4.23E-31	4.21E-28	
	209029	25.9156	70	0.	0.	0.	0.	0.	0.	7.14E-34	2.99E-32	2.75E-29	
	179728	22.2829	10	0.	0.	0.	0.	0.	1.59E-35	1.24E-31	1.62E-28	5.70E-26	
3s 3p 3d	167309	20.7431	2	0.	0.	0.	0.	1.86E-38	8.44E-34	3.54E-30	2.81E-27	4.62E-25	
	192093	23.8181	6	0.	0.	0.	0.	0.	3.07E-38	5.33E-34	1.13E-30	5.99E-28	
	220000*	27.2758	10	0.	0.	0.	0.	0.	0.	1.27E-38	8.20E-35	1.59E-31	
	228000*	28.2677	14	0.	0.	0.	0.	0.	0.	0.	6.51E-34	1.11E-32	
	289000*	33.5509	90	0.	0.	0.	0.	0.	0.	0.	0.	1.00E-32	
4f	249000*	30.8713	18	0.	0.	0.	0.	0.	0.	0.	0.	1.49E-35	
	273000*	33.8448	54	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	301000*	37.3183	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	309000*	38.3181	126	0.	0.	0.	0.	0.	0.	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
 HUNDREDS ENERGY LEVELS FROM MOORE (1949) AND MINNACHEN (1958, 1960)

TABLE 54 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar^+

[illegible]

TABLE 54 (CONT. 1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar+

LEVEL	TEMPERATURE (DEG K)											
	9400	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000
0	7.11E-01	7.11E-01	7.07E-01	7.04E-01	7.01E-01	6.99E-01	6.96E-01	6.95E-01	6.93E-01	6.91E-01	6.90E-01	6.88E-01
1432	2.87E-01	2.89E-01	2.93E-01	2.94E-01	2.99E-01	3.01E-01	3.04E-01	3.05E-01	3.07E-01	3.08E-01	3.09E-01	3.10E-01
108723	2.99E-08	5.72E-08	2.36E-07	7.47E-07	2.00E-06	4.90E-06	1.03E-05	1.77E-05	3.49E-05	5.81E-05	9.14E-05	1.30E-04
132476	8.48E-09	1.87E-08	1.05E-07	4.45E-07	1.50E-06	4.27E-06	1.04E-05	2.33E-05	4.64E-05	8.71E-05	1.53E-04	2.50E-04
146319	3.73E-09	8.95E-09	6.04E-08	2.94E-07	1.14E-06	3.60E-06	9.79E-06	2.35E-05	5.08E-05	1.01E-04	1.86E-04	3.23E-04
134028	4.49E-09	1.01E-08	5.94E-08	2.61E-07	9.13E-07	2.67E-06	6.75E-06	1.42E-05	3.12E-05	5.90E-05	1.04E-04	1.74E-04
158023	4.98E-10	1.20E-09	1.01E-08	5.61E-08	2.40E-07	8.35E-07	2.64E-06	6.32E-06	1.45E-05	3.05E-05	5.92E-05	1.07E-04
184453	1.13E-11	3.45E-11	3.95E-10	3.01E-09	1.40E-08	7.31E-08	2.42E-07	8.60E-07	2.14E-06	5.14E-06	1.12E-05	2.58E-05
195567	4.19E-12	1.35E-11	1.73E-10	1.45E-09	6.70E-09	4.11E-08	1.50E-07	5.04E-07	1.41E-06	3.54E-06	8.04E-06	1.80E-05
164082	1.86E-10	4.94E-10	4.22E-09	2.51E-08	1.14E-07	4.15E-07	1.27E-06	3.39E-06	8.60E-06	1.74E-05	3.44E-05	6.43E-05
148754	3.70E-10	9.01E-10	4.27E-09	3.16E-08	1.24E-07	4.01E-07	1.11E-06	2.69E-06	5.90E-06	1.19E-05	2.21E-05	3.87E-05
171831	3.50E-11	9.77E-11	9.19E-10	5.94E-09	2.89E-08	1.12E-07	3.63E-07	1.01E-06	2.51E-06	5.62E-06	1.16E-05	2.21E-05
194457	9.00E-13	2.97E-12	4.02E-11	3.53E-10	2.22E-09	1.07E-08	4.19E-08	1.30E-07	3.97E-07	1.01E-06	2.74E-06	4.99E-06
209029	3.04E-13	1.00E-12	1.65E-11	1.61E-10	1.10E-09	5.72E-09	2.39E-08	8.34E-08	2.52E-07	6.71E-07	1.61E-06	3.55E-06
179728	3.57E-12	1.03E-11	1.09E-10	7.70E-10	4.03E-09	1.64E-08	5.67E-08	1.64E-07	4.29E-07	9.97E-07	2.12E-06	4.17E-06
167309	4.59E-12	1.25E-11	1.11E-10	6.83E-10	3.10E-09	1.19E-08	3.73E-08	1.02E-07	2.42E-07	5.30E-07	1.00E-06	2.04E-06
192095	3.35E-13	1.04E-12	1.50E-11	1.05E-10	6.14E-10	2.80E-09	1.04E-08	3.28E-08	9.04E-08	2.22E-07	4.90E-07	1.03E-06
220000	8.53E-15	3.10E-14	5.63E-13	6.16E-12	4.67E-11	2.65E-10	1.19E-09	4.44E-09	1.42E-08	3.94E-08	1.00E-07	2.30E-07
228000	3.60E-15	1.61E-14	2.77E-13	3.30E-12	2.70E-11	1.63E-10	7.15E-10	3.03E-09	1.01E-08	2.94E-08	7.67E-08	1.81E-07
269000	4.97E-17	2.40E-16	8.34E-15	1.54E-13	1.05E-12	1.55E-11	9.74E-11	4.08E-10	2.02E-09	7.14E-09	2.21E-08	6.10E-08
249500	1.99E-16	8.83E-16	2.28E-14	3.43E-13	3.39E-12	2.42E-11	1.33E-10	5.90E-10	2.20E-09	7.04E-09	2.01E-08	5.12E-08
272000	1.64E-17	8.30E-17	2.94E-15	5.78E-14	7.14E-13	3.99E-11	2.04E-10	8.44E-10	3.11E-09	9.79E-09	2.79E-08	7.29E-08
301000	4.10E-19	2.70E-18	1.27E-16	3.34E-15	5.37E-14	5.70E-12	4.53E-11	2.75E-10	1.39E-09	5.51E-09	1.94E-08	6.11E-08
304000	1.73E-19	1.10E-18	6.23E-17	1.80E-15	3.10E-14	3.56E-13	2.95E-12	1.87E-11	9.30E-11	4.60E-10	1.50E-09	4.81E-09

TABLE 54 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR+

LEVEL	TEMPERATURE (DEG K)									
	10000	20000	32000	40000	44000	48000	0	0	0	0
0	6.81E-01	4.47E-01	6.41E-01	5.92E-01	5.42E-01	4.74E-01	0.	0.	0.	0.
1332	3.12E-01	3.10E-01	3.01E-01	2.83E-01	2.57E-01	2.27E-01	0.	0.	0.	0.
109723	5.03E-04	1.23E-03	2.41E-03	3.80E-03	5.43E-03	6.80E-03	0.	0.	0.	0.
132474	1.21E-03	3.69E-03	8.30E-03	1.50E-02	2.31E-02	3.13E-02	0.	0.	0.	0.
144319	1.89E-03	6.34E-03	1.54E-02	3.03E-02	4.91E-02	6.96E-02	0.	0.	0.	0.
134028	8.81E-04	2.77E-03	6.37E-03	1.17E-02	1.93E-02	2.50E-02	0.	0.	0.	0.
134023	7.07E-04	2.60E-03	7.10E-03	1.44E-02	2.49E-02	3.66E-02	0.	0.	0.	0.
184893	2.11E-04	1.02E-03	3.28E-03	7.73E-03	1.48E-02	2.39E-02	0.	0.	0.	0.
193567	1.74E-04	9.09E-04	3.04E-03	7.61E-03	1.50E-02	2.50E-02	0.	0.	0.	0.
163082	4.59E-04	1.82E-03	5.01E-03	1.04E-02	1.85E-02	2.78E-02	0.	0.	0.	0.
148754	2.28E-04	7.99E-04	2.00E-03	3.92E-03	6.43E-03	9.18E-03	0.	0.	0.	0.
171831	1.72E-04	7.32E-04	2.12E-03	4.64E-03	8.41E-03	1.29E-02	0.	0.	0.	0.
199657	5.39E-05	2.92E-04	1.01E-03	2.56E-03	5.15E-03	8.68E-03	0.	0.	0.	0.
209029	4.30E-05	2.53E-04	9.30E-04	2.47E-03	5.15E-03	8.95E-03	0.	0.	0.	0.
179728	3.54E-05	1.63E-04	4.94E-04	1.14E-03	2.11E-03	3.33E-03	0.	0.	0.	0.
167309	1.50E-05	6.14E-05	1.73E-04	3.74E-04	6.40E-04	1.00E-03	0.	0.	0.	0.
192093	1.02E-05	5.17E-05	1.71E-04	4.16E-04	8.11E-04	1.33E-03	0.	0.	0.	0.
220000	3.19E-04	2.05E-05	8.11E-05	2.21E-04	4.94E-04	8.93E-04	0.	0.	0.	0.
228000	2.74E-04	1.91E-05	7.92E-05	2.31E-04	5.20E-04	9.42E-04	0.	0.	0.	0.
269000	1.52E-04	1.49E-05	8.04E-05	2.69E-04	7.65E-04	1.62E-03	0.	0.	0.	0.
249000	1.01E-04	8.33E-06	3.94E-05	1.28E-04	3.14E-04	6.23E-04	0.	0.	0.	0.
273000	7.17E-07	7.28E-06	4.04E-05	1.48E-04	3.98E-04	6.52E-04	0.	0.	0.	0.
301000	2.23E-07	2.80E-06	1.91E-05	6.04E-05	2.42E-04	5.89E-04	0.	0.	0.	0.
309000	1.93E-07	2.67E-06	1.87E-05	6.17E-05	2.54E-04	6.13E-04	0.	0.	0.	0.

TABLE 55. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C **

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			3200	3400	4000	4400	4800	5200	5600	6000	6400	
2s	0	1	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	
	52419	9	5.23E-10	7.17E-09	5.83E-08	3.24E-07	1.35E-06	4.52E-06	1.27E-05	3.13E-05	6.80E-05	
	102378	3	3.04E-20	5.10E-18	3.09E-16	8.67E-15	1.31E-13	1.58E-12	1.13E-11	6.34E-11	3.03E-10	
	137454	5	1.70E-17	1.25E-16	3.03E-14	2.72E-13	1.15E-11	2.76E-10	4.14E-09	4.34E-08	3.42E-07	
	145875	3	1.64E-28	2.39E-25	6.15E-23	9.61E-21	5.12E-19	1.40E-17	2.64E-16	3.21E-15	2.06E-14	
2p	182520	1	2.29E-36	2.09E-32	3.07E-29	1.20E-26	1.74E-24	1.17E-22	4.31E-21	9.01E-20	1.51E-18	
	240452	4	0.	0.	1.10E-37	2.89E-34	2.00E-31	5.11E-29	9.93E-27	3.64E-25	1.34E-23	
	259501	12	0.	0.	0.	1.60E-36	1.90E-33	7.37E-31	1.33E-28	1.73E-26	5.33E-25	
	271631	20	0.	0.	0.	0.	0.72E-35	4.50E-32	9.82E-30	1.03E-27	6.03E-26	
	310023	4	0.	0.	0.	0.	0.	2.23E-37	1.02E-34	2.67E-32	2.15E-30	
2p	318950	12	0.	0.	0.	0.	0.	0.	3.09E-35	7.29E-33	8.68E-31	
	322129	28	0.	0.	0.	0.	0.	0.	2.28E-35	5.67E-33	7.00E-31	
	322104	28	0.	0.	0.	0.	0.	0.	3.14E-35	7.83E-33	9.79E-31	
	3303714	12	0.	0.	0.	0.	0.	9.61E-37	4.29E-34	8.69E-32	8.67E-30	
	326459	36	0.	0.	0.	0.	0.	0.	1.35E-35	3.61E-33	6.82E-31	
3s	337058	40	0.	0.	0.	0.	0.	0.	1.47E-36	4.74E-34	7.41E-32	
	376970**	12	0.	0.	0.	0.	0.	0.	0.	0.	1.86E-36	
	383400**	24	0.	0.	0.	0.	0.	0.	0.	0.	1.33E-36	
	387400**	40	0.	0.	0.	0.	0.	0.	0.	0.	9.01E-37	
	388000**	84	0.	0.	0.	0.	0.	0.	0.	0.	1.10E-36	

**ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM MOORE (1949) AND BOCKASTEN (1955)

TABLE 55 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C ++

LEVEL (CM-1)	TEMPERATURE (DEG K)											
	6800	7200	7600	8000	8400	8800	9200	9600	10000	11000	12000	13000
0	1.00E-00	1.00E-00	1.00E-00	9.99E-01	9.99E-01	9.99E-01	9.99E-01	9.97E-01	9.95E-01	9.91E-01	9.83E-01	9.73E-01
52519	1.37E-04	2.54E-04	4.41E-04	7.24E-04	1.13E-03	1.70E-03	2.47E-03	3.47E-03	4.75E-03	6.39E-03	8.42E-02	2.45E-02
102378	1.17E-09	3.91E-09	1.15E-08	3.02E-08	7.26E-08	1.61E-07	3.33E-07	6.48E-07	1.20E-06	4.54E-06	1.30E-05	3.50E-05
137454	2.11E-12	1.04E-11	4.50E-11	1.65E-10	5.34E-10	1.56E-09	4.14E-09	1.01E-08	2.31E-08	1.39E-07	9.16E-07	2.17E-06
149075	1.97E-13	1.09E-12	5.07E-12	2.02E-11	7.03E-11	2.19E-10	6.17E-10	1.59E-09	3.82E-09	2.34E-08	1.25E-07	4.74E-07
182320	1.69E-17	1.44E-16	9.85E-16	5.54E-15	2.64E-14	1.09E-13	4.00E-13	1.31E-12	3.92E-12	4.24E-11	3.00E-10	1.64E-09
240452	3.21E-22	5.42E-21	6.80E-20	6.62E-19	5.19E-18	3.37E-17	1.84E-16	8.91E-16	3.74E-15	8.69E-14	1.19E-12	1.00E-11
259501	1.71E-23	3.61E-22	5.54E-21	6.44E-20	5.94E-19	4.49E-18	2.84E-17	1.54E-16	7.28E-16	3.43E-14	3.63E-13	3.93E-12
271631	2.19E-24	5.34E-23	9.29E-22	1.21E-20	1.24E-19	1.03E-18	7.09E-18	4.14E-17	2.12E-16	1.41E-15	1.41E-13	1.71E-12
310023	1.30E-28	4.97E-27	1.50E-25	2.44E-24	3.44E-23	3.87E-22	3.50E-21	2.64E-20	1.69E-19	9.71E-18	2.03E-16	4.80E-15
318950	5.90E-29	2.50E-27	7.17E-26	1.47E-24	2.29E-23	2.70E-22	2.40E-21	2.00E-20	1.40E-19	9.04E-18	2.91E-16	5.44E-15
322129	5.01E-29	2.21E-27	6.55E-26	1.38E-24	2.10E-23	2.67E-22	2.44E-21	2.15E-20	1.43E-19	9.94E-18	3.31E-16	6.40E-15
322184	6.94E-29	3.04E-27	9.07E-26	1.91E-24	3.02E-23	3.71E-22	3.44E-21	2.90E-20	2.04E-19	1.30E-17	4.61E-16	8.90E-15
308714	5.14E-28	1.94E-26	4.93E-25	9.25E-24	1.30E-22	1.64E-21	1.29E-20	9.43E-20	6.12E-19	3.44E-17	9.93E-16	1.60E-15
326459	3.61E-29	1.60E-27	5.19E-25	1.14E-24	1.87E-23	2.37E-22	2.41E-21	2.02E-20	1.43E-19	1.02E-17	3.55E-16	7.13E-15
337058	6.39E-30	3.24E-28	1.14E-26	2.89E-25	5.07E-24	6.99E-23	7.64E-22	6.80E-21	5.10E-20	4.74E-18	1.64E-16	3.40E-15
374970	2.75E-34	2.31E-32	1.32E-30	4.11E-29	1.99E-27	2.70E-26	2.80E-25	3.47E-24	3.33E-23	4.60E-21	2.77E-19	8.97E-18
383400	2.11E-34	1.82E-32	1.04E-30	4.17E-29	1.82E-27	2.19E-26	2.37E-25	3.90E-24	3.64E-23	5.83E-21	3.84E-19	1.31E-17
387400	1.51E-34	1.44E-32	8.43E-31	3.34E-29	9.12E-28	1.04E-26	3.72E-25	2.44E-24	2.71E-23	5.84E-21	3.97E-19	1.40E-17
388000	1.60E-34	1.70E-32	1.00E-30	4.13E-29	1.13E-27	2.30E-26	3.72E-25	4.64E-24	4.76E-23	7.30E-21	5.17E-19	1.63E-17

TABLE 55 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C \leftrightarrow

LEVEL	TEMPERATURE (DEG F)												
	(C4-1)	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000	36000	40000
0	9.60E-01	9.64E-01	9.29E-01	9.03E-01	8.79E-01	8.94E-01	8.27E-01	7.15E-01	6.12E-01	5.24E-01	4.52E-01	3.94E-01	3.94E-01
1	9.77E-02	5.37E-02	7.47E-02	9.62E-02	1.20E-01	1.20E-01	1.71E-01	2.70E-01	4.67E-01	6.97E-01	9.01E-01	5.30E-01	5.30E-01
2	1.82E19	7.95E-02	2.79E-04	6.60E-04	1.37E-04	1.10E-03	1.57E-03	4.63E-03	9.32E-03	1.57E-02	2.27E-02	5.20E-02	5.20E-02
3	1.37E54	6.3E-06	3.57E-05	7.21E-05	1.34E-04	2.32E-04	3.70E-04	1.70E-03	4.71E-03	7.76E-03	1.67E-02	2.53E-02	2.53E-02
4	1.15E75	3.96E-06	9.29E-06	1.94E-05	3.79E-05	6.80E-05	1.14E-04	5.69E-04	1.70E-03	3.71E-03	6.64E-03	1.04E-02	1.04E-02
5	1.82E20	8.65E-06	6.89E-06	1.77E-07	4.94E-07	8.48E-07	1.64E-06	1.27E-05	5.17E-05	1.43E-04	3.07E-04	5.54E-04	5.54E-04
6	2.46E52	7.12E-11	3.64E-10	1.51E-09	5.24E-09	1.80E-08	4.22E-08	1.02E-07	1.57E-06	4.23E-05	1.21E-04	2.76E-04	2.76E-04
7	2.95E501	5.02E-11	1.75E-10	8.14E-10	3.14E-09	1.03E-08	2.99E-08	7.74E-08	1.50E-06	5.30E-05	1.74E-04	4.10E-04	4.10E-04
8	2.77E631	1.44E-11	9.13E-11	4.50E-10	1.87E-09	6.54E-09	1.99E-08	5.39E-08	1.04E-05	5.26E-05	1.70E-04	4.50E-04	4.50E-04
9	3.10E623	5.50E-16	4.40E-13	2.89E-12	1.45E-11	6.00E-11	2.10E-10	6.01E-10	2.43E-08	2.95E-07	1.09E-06	2.24E-05	2.24E-05
10	3.18E950	8.70E-14	5.84E-13	3.48E-12	2.05E-11	8.94E-11	3.32E-10	1.00E-09	4.24E-08	3.72E-07	1.50E-05	4.92E-05	4.92E-05
11	3.32E129	8.05E-16	7.20E-13	4.04E-12	2.61E-11	1.14E-10	4.35E-10	1.43E-09	5.07E-08	3.37E-06	2.32E-05	7.32E-05	7.32E-05
12	3.32E814	1.12E-13	1.00E-12	6.77E-12	4.64E-11	3.14E-10	6.04E-10	1.99E-09	8.19E-08	7.54E-06	3.24E-05	1.62E-04	1.62E-04
13	3.60E716	1.25E-13	1.54E-12	9.75E-12	4.87E-11	2.03E-10	7.21E-10	2.25E-09	7.07E-08	9.67E-06	2.30E-05	7.12E-05	7.12E-05
14	3.28E459	9.29E-16	8.59E-13	5.93E-12	3.24E-11	1.47E-10	5.64E-10	1.80E-09	8.15E-08	1.14E-06	3.91E-05	1.13E-04	1.13E-04
15	3.37E558	5.21E-16	5.14E-13	3.01E-12	2.21E-11	1.05E-10	4.21E-10	1.44E-09	7.19E-08	1.10E-06	3.03E-05	1.28E-04	1.28E-04
16	3.76E976	1.72E-16	2.24E-13	1.11E-14	1.51E-13	6.65E-13	4.10E-12	1.64E-11	1.31E-09	2.94E-08	1.59E-06	6.11E-05	6.11E-05
17	3.30E490	3.00E-16	3.03E-13	1.94E-14	2.69E-13	1.55E-12	7.56E-12	3.38E-11	2.60E-09	6.12E-08	3.40E-06	1.95E-05	1.95E-05
18	3.07E400	2.95E-16	4.12E-13	4.12E-13	1.80E-12	9.10E-12	9.31E-12	3.91E-11	3.52E-09	8.90E-08	5.54E-07	2.10E-05	2.10E-05
19	3.00E900	2.80E-16	5.45E-13	5.47E-14	4.16E-13	2.51E-12	1.23E-11	5.24E-11	4.75E-09	1.13E-07	7.00E-06	2.60E-05	2.60E-05

TABLE 55 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C II

LEVEL (CII-1)	TEMPERATURE (DEG K)									
	44000	48000	52000	56000	60000	64000	68000	72000	76000	80000
0	3.47E-01	3.08E-01	2.24E-01	1.40E-01	9.11E-02	2.10E-02	7.44E-03	5.11E-03	3.75E-03	0.
52619	5.62E-01	5.76E-01	5.73E-01	4.92E-01	3.84E-01	1.29E-01	5.59E-02	4.04E-02	3.13E-02	0.
102378	3.44E-02	4.29E-02	5.76E-02	6.67E-02	6.26E-02	3.01E-02	1.54E-02	1.20E-02	9.77E-03	0.
137654	3.49E-02	4.50E-02	7.44E-02	1.07E-01	1.13E-01	7.02E-02	4.00E-02	3.31E-02	2.77E-02	0.
145675	1.47E-02	1.94E-02	3.39E-02	5.09E-02	5.50E-02	3.07E-02	2.20E-02	1.80E-02	1.52E-02	0.
182328	8.87E-04	1.30E-03	2.01E-03	5.24E-03	6.59E-03	5.44E-03	3.84E-03	3.30E-03	2.89E-03	0.
244452	5.34E-04	9.12E-04	2.80E-03	7.43E-03	1.15E-02	1.69E-02	1.28E-02	1.13E-02	1.00E-02	0.
259501	8.59E-04	1.53E-03	5.33E-03	1.50E-02	2.61E-02	3.89E-02	3.51E-02	3.29E-02	3.10E-02	0.
271631	9.43E-04	1.70E-03	6.44E-03	2.13E-02	3.64E-02	5.94E-02	5.60E-02	5.33E-02	5.08E-02	0.
310023	5.49E-05	1.13E-04	5.29E-04	2.13E-03	4.21E-03	9.01E-03	9.76E-03	9.72E-03	9.61E-03	0.
318950	1.22E-01	2.40E-01	1.23E-01	5.43E-01	1.11E-02	2.93E-02	2.83E-02	2.85E-02	2.85E-02	0.
323129	1.96E-04	3.94E-04	1.98E-03	8.53E-03	1.77E-02	4.13E-02	4.67E-02	4.72E-02	4.72E-02	0.
323184	2.54E-04	5.51E-04	2.76E-03	1.20E-02	2.47E-02	5.78E-02	6.54E-02	6.61E-02	6.61E-02	0.
308716	1.72E-04	3.54E-04	1.64E-03	6.53E-03	2.73E-02	2.94E-02	2.94E-02	2.93E-02	2.93E-02	0.
320459	2.89E-04	6.23E-04	3.21E-03	1.42E-02	2.90E-02	7.20E-02	8.20E-02	8.41E-02	8.42E-02	0.
337958	3.40E-04	7.54E-04	4.19E-03	1.94E-02	4.28E-02	1.11E-01	1.33E-01	1.37E-01	1.39E-01	0.
376970	1.04E-01	6.57E-01	3.10E-01	1.91E-01	4.82E-01	1.67E-02	2.36E-02	2.40E-02	2.42E-02	0.
383488	4.48E-05	1.13E-04	8.19E-04	5.11E-03	1.32E-02	4.73E-02	6.75E-02	7.34E-02	7.78E-02	0.
307400	6.54E-03	1.67E-04	1.24E-03	7.93E-03	2.07E-02	7.75E-02	1.11E-01	1.21E-01	1.29E-01	0.
300000	9.00E-05	2.34E-04	1.71E-03	1.10E-02	2.88E-02	1.00E-01	1.59E-01	1.69E-01	1.80E-01	0.

TABLE 56. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF H⁺

STATE	LEVEL (CM ⁻¹)	STAT. WT.	TEMPERATURE (DEG K)									
			3200	3600	4000	4400	4800	5200	5600	6000	6400	
2p ² 2p ¹ 3p ¹	0	2	3.51E-01	3.47E-01	3.43E-01	3.44E-01	3.45E-01	3.44E-01	3.43E-01	3.42E-01	3.42E-01	
	174	4	6.49E-01	6.51E-01	6.54E-01	6.54E-01	6.55E-01	6.54E-01	6.57E-01	6.57E-01	6.56E-01	
	57203	12	1.37E-11	2.34E-10	2.34E-09	1.52E-08	7.23E-08	2.76E-07	6.56E-07	2.23E-06	5.94E-06	
	101027	10	3.29E-20	5.09E-18	2.07E-16	7.70E-15	1.23E-13	1.23E-12	9.16E-12	5.16E-11	2.34E-10	
	131004	2	9.21E-27	6.37E-24	1.19E-21	6.61E-20	3.65E-18	6.23E-17	6.20E-16	7.70E-15	5.54E-14	
2p ² 2p ¹ 3p ¹	145950	6	1.33E-29	6.87E-26	1.45E-23	1.95E-21	1.04E-19	2.90E-18	5.34E-17	6.40E-16	5.70E-15	
	184002	4	2.34E-37	2.63E-33	4.50E-30	2.05E-27	3.32E-25	2.44E-23	9.04E-22	2.41E-20	3.92E-19	
	203079	10	0.	9.84E-36	3.20E-32	2.60E-29	6.31E-27	6.00E-25	3.70E-23	1.22E-21	2.64E-20	
	230407	6	0.	0.	1.04E-36	1.97E-33	1.09E-30	2.12E-28	2.01E-26	1.09E-24	3.20E-23	
	221302	2	0.	0.	9.34E-36	1.25E-32	5.34E-30	6.79E-28	6.90E-26	3.67E-24	6.40E-23	
2p ² 2p ¹ 3p ¹	245490	6	0.	0.	0.	1.33E-35	1.07E-32	3.09E-30	3.97E-28	2.64E-26	1.04E-24	
	267242	10	0.	0.	0.	1.93E-38	2.60E-35	1.33E-32	2.60E-30	2.50E-28	1.30E-26	
	301060	2	0.	0.	0.	0.	0.	2.27E-37	6.71E-35	1.51E-32	1.37E-30	
	311700	6	0.	0.	0.	0.	0.	3.61E-36	1.71E-33	3.50E-31	3.70E-30	
	319230	24	0.	0.	0.	0.	0.	0.	9.04E-36	2.30E-33	2.70E-31	
2p ² 2p ¹ 3p ¹	370039	16	0.	0.	0.	0.	4.20E-38	3.49E-35	1.09E-32	1.90E-30	1.24E-28	
	316449	54	0.	0.	0.	0.	0.	1.52E-37	7.90E-35	1.40E-32	1.80E-30	
	334453	90	0.	0.	0.	0.	0.	0.	7.43E-37	2.20E-34	3.42E-32	
	304130**	200	0.	0.	0.	0.	0.	0.	0.	0.	1.54E-36	
	305000**	54	0.	0.	0.	0.	0.	0.	0.	0.	2.30E-37	
2p ² 2p ¹ 3p ¹	447500**	96	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	432000**	162	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	442700**	208	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	444000**	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	506100**	160	0.	0.	0.	0.	0.	0.	0.	0.	0.	
2p ² 2p ¹ 3p ¹	492000**	18	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	552000**	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	604375	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	664375	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	664375	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949)

TABLE 54 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF M^{++}

LEVEL (CM-1)	TEMPERATURE (DEG K)										
	6000	7000	8000	8400	8800	9200	9600	10000	11000	12000	13000
0	3.42E-01	3.41E-01	3.40E-01	3.42E-01	3.40E-01	3.39E-01	3.39E-01	3.39E-01	3.30E-01	3.37E-01	3.34E-01
174	6.58E-01	6.59E-01	6.60E-01	6.60E-01	6.60E-01	6.60E-01	6.61E-01	6.61E-01	6.61E-01	6.61E-01	6.60E-01
57283	1.12E-05	2.19E-05	6.85E-05	1.12E-04	1.74E-04	2.62E-04	3.68E-04	5.35E-04	1.13E-03	2.11E-03	3.54E-03
101027	8.89E-10	2.91E-09	8.42E-09	5.19E-08	1.14E-07	2.33E-07	4.56E-07	8.24E-07	3.26E-06	9.25E-06	2.34E-05
131004	3.13E-13	1.44E-12	1.99E-11	6.11E-11	1.49E-10	4.29E-10	1.01E-09	2.21E-09	1.22E-08	5.09E-08	1.70E-07
145950	3.97E-14	2.21E-13	4.07E-12	1.42E-11	4.41E-11	1.24E-10	3.22E-10	7.71E-10	5.19E-09	2.54E-08	9.74E-08
184802	4.67E-18	2.90E-16	1.75E-15	8.64E-15	3.70E-14	1.90E-13	4.70E-13	1.44E-12	1.44E-11	1.24E-10	7.04E-10
203079	3.73E-19	4.05E-18	3.42E-17	1.38E-16	6.44E-15	2.73E-14	1.03E-13	3.44E-13	9.9E-12	4.49E-11	2.92E-10
230407	6.89E-22	1.16E-19	1.03E-18	7.40E-17	4.44E-16	2.28E-15	1.02E-14	4.07E-14	8.27E-14	1.02E-12	9.50E-12
221302	1.50E-21	2.12E-20	1.76E-19	1.17E-17	6.56E-17	3.46E-16	1.34E-15	5.03E-15	9.07E-14	1.01E-12	7.76E-12
245690	2.72E-23	4.87E-22	6.99E-20	5.40E-19	3.65E-18	2.09E-17	1.04E-16	4.32E-16	1.12E-14	1.63E-13	1.57E-12
267242	4.74E-25	1.82E-23	2.28E-21	2.24E-20	1.79E-19	1.20E-18	6.83E-18	3.39E-17	1.11E-15	2.05E-14	2.40E-13
301046	7.35E-29	5.99E-26	1.03E-24	1.34E-23	1.42E-22	1.20E-21	8.54E-21	5.20E-20	2.44E-18	7.09E-17	1.13E-15
311708	2.33E-29	9.08E-28	2.41E-26	4.60E-25	6.61E-24	6.87E-23	5.23E-22	3.39E-20	1.99E-18	5.94E-17	1.85E-15
319238	1.69E-29	8.07E-28	4.75E-25	7.30E-24	8.75E-23	6.46E-22	4.77E-21	4.50E-20	2.90E-18	6.64E-17	1.83E-15
290839	5.70E-27	1.74E-25	5.80E-23	7.09E-22	6.02E-21	5.39E-20	3.50E-19	2.05E-18	9.14E-17	2.10E-15	3.17E-14
314449	1.17E-28	4.78E-27	1.29E-25	3.73E-23	4.31E-22	4.04E-21	3.12E-20	2.02E-19	1.25E-17	3.09E-16	6.90E-15
334445	2.85E-30	1.45E-28	4.80E-27	1.15E-25	2.82E-24	2.73E-23	2.60E-22	1.73E-20	1.53E-18	5.04E-17	1.27E-15
384130	2.40E-34	2.26E-32	1.20E-30	4.84E-29	1.30E-27	2.59E-26	3.97E-25	4.85E-24	4.83E-22	4.83E-19	1.47E-17
305000	3.84E-35	3.56E-33	2.04E-31	7.80E-30	2.11E-28	4.22E-27	7.90E-25	8.02E-24	1.23E-21	8.16E-20	2.04E-18
447900	0.	0.	2.64E-36	1.82E-34	8.40E-33	2.79E-31	1.21E-28	1.77E-27	6.14E-25	8.09E-23	5.00E-21
432000	0.	0.	8.91E-37	8.37E-35	4.99E-33	2.82E-31	1.25E-28	2.09E-27	7.90E-26	8.74E-22	4.49E-20
492700	0.	0.	0.	0.	1.09E-35	5.82E-34	4.16E-31	7.97E-28	5.00E-27	1.07E-26	1.01E-22
946000	0.	0.	0.	0.	1.02E-32	3.20E-31	7.79E-30	1.42E-28	2.04E-27	9.04E-25	5.53E-21
504100	0.	0.	0.	0.	6.12E-37	3.15E-35	1.15E-33	3.10E-32	6.44E-31	1.20E-29	1.27E-23
492000	0.	0.	0.	0.	7.71E-37	3.55E-35	1.17E-33	2.89E-32	5.31E-31	1.43E-28	6.80E-24
952000	0.	0.	0.	0.	0.	0.	1.75E-37	6.30E-36	1.75E-34	2.30E-31	1.50E-26

TABLE 5A (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N++

LEVEL	TEMPERATURE (DEG K)											
	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000	36000	40000
0	3.35E-01	3.34E-01	3.33E-01	3.31E-01	3.29E-01	3.27E-01	3.25E-01	3.14E-01	3.00E-01	2.84E-01	2.70E-01	2.58E-01
174	4.59E-01	4.57E-01	4.55E-01	4.53E-01	4.50E-01	4.48E-01	4.45E-01	4.21E-01	4.05E-01	3.87E-01	3.73E-01	3.61E-01
97283	5.59E-03	5.24E-03	4.84E-03	4.44E-03	4.04E-03	3.64E-03	3.24E-03	2.84E-03	2.44E-03	2.04E-03	1.64E-03	1.24E-03
101037	5.19E-05	1.03E-04	1.89E-04	3.20E-04	5.12E-04	7.79E-04	1.13E-03	1.68E-03	2.44E-03	3.50E-03	4.96E-03	6.82E-03
131004	4.77E-07	1.17E-06	2.55E-06	5.87E-06	9.33E-06	1.41E-05	2.02E-05	2.84E-05	3.90E-05	5.36E-05	7.22E-05	9.58E-05
145950	3.04E-07	8.34E-07	1.99E-06	4.29E-06	8.48E-06	1.54E-05	2.60E-05	4.44E-05	7.60E-05	1.21E-04	1.97E-04	3.03E-04
164402	3.04E-09	1.11E-08	3.37E-08	9.32E-08	2.16E-07	4.71E-07	9.40E-07	1.60E-06	2.80E-06	4.71E-06	7.87E-06	1.24E-05
203079	1.45E-09	5.80E-09	1.95E-08	5.40E-08	1.47E-07	3.43E-07	7.35E-07	1.60E-06	3.41E-06	7.50E-06	1.64E-05	3.60E-05
230407	5.24E-11	2.53E-10	1.00E-09	3.30E-09	9.42E-09	2.60E-08	6.17E-08	1.44E-07	3.40E-07	7.71E-07	1.72E-06	3.93E-06
221302	4.49E-11	2.02E-10	7.56E-10	2.43E-09	8.05E-09	1.73E-08	3.96E-08	8.43E-08	1.84E-07	4.10E-07	9.00E-07	1.91E-06
245490	1.09E-11	5.04E-11	2.54E-10	9.24E-10	2.92E-09	9.17E-09	2.04E-08	3.70E-07	2.96E-06	1.37E-05	6.41E-05	1.11E-04
267252	1.90E-12	1.23E-11	6.09E-11	2.49E-10	9.70E-10	2.60E-09	7.27E-09	1.73E-07	1.43E-06	6.32E-06	3.11E-05	8.54E-05
301048	1.22E-14	9.38E-14	5.00E-13	2.04E-12	1.16E-11	4.10E-11	1.27E-10	4.55E-09	3.73E-08	3.71E-07	3.61E-06	5.87E-06
311708	1.23E-14	1.04E-13	6.70E-13	3.47E-12	1.49E-11	5.51E-11	1.70E-10	7.22E-09	9.97E-08	7.02E-07	3.15E-06	1.69E-05
319238	2.27E-14	2.02E-13	1.34E-12	7.33E-12	3.27E-11	1.25E-10	4.14E-10	1.44E-08	2.71E-07	2.00E-06	9.38E-06	3.14E-05
290839	3.15E-13	2.31E-12	1.31E-11	6.00E-11	2.30E-10	8.02E-10	2.40E-09	7.57E-08	6.74E-07	5.30E-06	2.18E-05	6.30E-05
314449	8.34E-14	7.10E-13	4.71E-12	2.47E-11	1.00E-10	4.03E-10	1.32E-09	5.51E-08	7.79E-07	5.50E-06	2.94E-05	8.44E-05
334445	1.70E-14	1.70E-13	1.30E-12	7.09E-12	3.44E-11	1.40E-10	5.20E-10	2.77E-08	4.65E-07	3.79E-06	1.91E-05	6.02E-05
304130	3.44E-16	4.70E-15	6.77E-14	3.42E-13	2.19E-12	1.10E-11	4.67E-11	4.51E-09	1.14E-07	1.30E-06	8.37E-06	3.47E-05
305000	5.93E-17	8.27E-16	8.20E-15	6.31E-14	3.04E-13	1.93E-12	8.22E-12	8.02E-10	2.00E-08	2.34E-07	1.52E-06	6.47E-06
447500	1.71E-19	3.64E-18	5.33E-17	5.64E-16	4.62E-15	3.01E-14	1.63E-13	3.37E-11	1.49E-09	2.80E-08	2.22E-07	1.25E-06
432000	1.42E-18	2.73E-17	3.63E-16	3.55E-15	2.69E-14	1.65E-13	8.39E-13	1.44E-11	5.54E-09	8.40E-08	6.92E-07	3.60E-06
492700	4.94E-21	1.44E-19	2.75E-18	3.70E-17	3.74E-16	2.95E-15	1.89E-14	6.72E-12	4.37E-10	6.04E-09	1.09E-07	7.39E-07
444000	1.87E-19	3.94E-18	5.72E-17	6.03E-16	4.08E-15	3.17E-14	1.70E-13	3.45E-11	2.51E-09	2.21E-08	2.21E-07	1.24E-06
504100	6.92E-22	2.21E-20	4.51E-19	6.62E-18	7.11E-17	5.94E-16	4.01E-15	1.67E-12	1.22E-10	2.99E-09	3.55E-08	2.54E-07
492000	3.32E-22	9.42E-21	1.83E-19	2.46E-18	2.47E-17	1.94E-16	1.24E-15	4.38E-13	2.63E-11	6.34E-10	7.02E-09	4.74E-08
552000	1.24E-24	5.41E-23	1.47E-21	2.72E-20	3.63E-19	3.40E-18	2.95E-17	2.13E-14	2.31E-12	7.40E-11	1.13E-09	9.70E-08

TABLE 56 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N⁺⁺

LEVEL (CM ⁻¹)	TEMPERATURE (DEG K)										0	0	0	0
	44000	48000	60000	80000	100000	200000	400000	600000	1000000	1800000				
0	2.41E-01	2.27E-01	1.40E-01	1.39E-01	9.09E-02	2.04E-02	5.80E-03	3.64E-03	2.49E-03	0.	0.	0.	0.	0.
174	2.79E-01	4.52E-01	3.79E-01	2.70E-01	1.99E-01	6.07E-02	1.14E-02	7.28E-03	4.94E-03	0.	0.	0.	0.	0.
57283	2.42E-01	2.43E-01	2.09E-01	2.92E-01	2.50E-01	8.09E-02	2.83E-02	1.91E-02	1.37E-02	0.	0.	0.	0.	0.
101027	4.43E-02	5.50E-02	1.13E-01	1.13E-01	1.14E-01	4.92E-02	2.02E-02	1.33E-02	1.07E-02	0.	0.	0.	0.	0.
131806	3.32E-03	4.40E-03	8.23E-03	1.32E-02	1.49E-02	7.94E-03	3.62E-03	2.04E-03	2.04E-03	0.	0.	0.	0.	0.
149950	6.11E-03	6.50E-03	1.73E-02	3.01E-02	3.60E-02	2.14E-02	1.03E-02	7.78E-03	6.04E-03	0.	0.	0.	0.	0.
104402	1.07E-03	1.60E-03	4.32E-03	9.69E-03	1.33E-02	1.04E-02	5.92E-03	4.63E-03	3.80E-03	0.	0.	0.	0.	0.
203079	1.97E-03	2.50E-03	7.31E-03	1.81E-02	2.44E-02	2.34E-02	1.40E-02	1.12E-02	9.27E-03	0.	0.	0.	0.	0.
230407	3.84E-04	6.82E-04	2.20E-03	6.63E-03	1.07E-02	1.16E-02	7.59E-03	6.29E-03	5.35E-03	0.	0.	0.	0.	0.
221302	1.77E-04	2.99E-04	9.44E-04	2.60E-03	4.04E-03	4.14E-03	2.62E-03	2.14E-03	1.81E-03	0.	0.	0.	0.	0.
243690	2.34E-04	4.32E-04	1.50E-03	5.04E-03	8.57E-03	1.04E-02	7.19E-03	6.04E-03	5.23E-03	0.	0.	0.	0.	0.
267242	1.93E-04	3.77E-04	1.57E-03	5.78E-03	1.05E-02	1.49E-02	1.11E-02	9.60E-03	8.43E-03	0.	0.	0.	0.	0.
301000	1.25E-05	2.73E-05	1.39E-04	6.20E-04	1.29E-03	2.33E-03	1.96E-03	1.77E-03	1.61E-03	0.	0.	0.	0.	0.
311708	2.71E-05	5.97E-05	3.24E-04	1.54E-03	3.31E-03	6.49E-03	5.67E-03	5.10E-03	4.70E-03	0.	0.	0.	0.	0.
319236	8.44E-05	1.90E-04	1.00E-03	5.37E-03	1.19E-02	2.44E-02	2.21E-02	2.53E-02	1.80E-02	0.	0.	0.	0.	0.
290039	1.61E-04	3.35E-04	1.60E-03	6.71E-03	1.44E-02	2.24E-02	1.83E-02	1.63E-02	1.47E-02	0.	0.	0.	0.	0.
314449	2.23E-04	4.95E-04	2.73E-03	1.32E-02	2.87E-02	5.73E-02	5.05E-02	4.63E-02	4.24E-02	0.	0.	0.	0.	0.
314445	1.93E-04	4.53E-04	2.62E-03	1.53E-02	3.50E-02	8.24E-02	7.04E-02	7.33E-02	6.91E-02	0.	0.	0.	0.	0.
304130	1.27E-04	3.27E-04	2.14E-03	2.01E-02	5.61E-02	1.85E-02	2.10E-01	2.09E-01	2.04E-01	0.	0.	0.	0.	0.
305000	2.22E-05	5.97E-05	5.03E-04	3.70E-03	1.04E-02	3.45E-02	3.92E-02	3.91E-02	3.85E-02	0.	0.	0.	0.	0.
447500	5.10E-06	1.63E-05	2.00E-04	2.14E-03	7.52E-03	3.91E-02	5.57E-02	5.90E-02	6.24E-02	0.	0.	0.	0.	0.
432000	1.43E-05	4.30E-05	4.89E-04	4.77E-03	1.59E-02	7.37E-02	9.93E-02	1.05E-01	1.08E-01	0.	0.	0.	0.	0.
492700	3.49E-06	1.24E-05	2.03E-04	2.89E-03	1.10E-02	8.47E-02	1.42E-01	1.61E-01	1.70E-01	0.	0.	0.	0.	0.
444000	5.03E-06	1.60E-05	1.94E-04	2.04E-03	7.20E-03	3.70E-02	5.23E-02	5.93E-02	5.80E-02	0.	0.	0.	0.	0.
506100	1.25E-06	4.60E-06	8.17E-05	1.24E-03	5.39E-03	4.27E-02	7.51E-02	8.44E-02	9.59E-02	0.	0.	0.	0.	0.
492000	2.23E-07	8.05E-07	1.29E-05	1.80E-04	7.43E-04	5.32E-03	8.60E-03	1.01E-02	1.10E-02	0.	0.	0.	0.	0.
552000	5.50E-08	2.37E-07	5.43E-06	1.09E-04	5.57E-04	6.14E-03	1.27E-02	1.55E-02	1.80E-02	0.	0.	0.	0.	0.

TABLE 57. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O++

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			3200	3400	4000	4400	4800	5200	5600	6000	6400	
2s 2p ³ P ^o	0	1	1.42E-01	1.21E-01	1.20E-01	1.19E-01	1.18E-01	1.17E-01	1.17E-01	1.16E-01	1.16E-01	
	1	3	3.47E-01	3.44E-01	3.44E-01	3.43E-01	3.42E-01	3.41E-01	3.40E-01	3.39E-01	3.38E-01	
	2	5	5.31E-01	5.33E-01	5.34E-01	5.35E-01	5.36E-01	5.37E-01	5.40E-01	5.40E-01	5.40E-01	
	3	5	6.70E-05	1.83E-04	4.07E-04	7.64E-04	1.35E-03	2.15E-03	3.19E-03	4.30E-03	6.07E-03	
	4	5	4.30E-10	3.89E-09	2.14E-08	8.74E-08	2.82E-07	7.59E-07	1.77E-06	3.70E-06	7.03E-06	
2s 2p ¹ P ^o	0	5	1.02E-12	2.05E-11	2.27E-10	1.62E-09	8.31E-09	3.32E-08	1.09E-07	3.04E-07	7.48E-07	
	1	15	6.63E-24	2.64E-21	3.17E-19	1.60E-17	4.10E-16	6.62E-15	7.07E-14	5.50E-13	3.51E-12	
	2	9	1.73E-28	2.10E-25	6.16E-23	6.43E-21	3.10E-19	8.21E-18	1.34E-16	1.59E-15	1.51E-14	
	3	3	0.	2.24E-35	5.95E-32	3.63E-29	7.81E-27	7.31E-25	5.97E-23	1.04E-21	1.99E-20	
	4	5	1.82E-37	2.06E-33	3.61E-30	1.62E-27	2.64E-25	1.96E-23	7.89E-22	1.93E-20	3.16E-19	
2p ³ P	0	3	210459	25.09E9	36.94E21	4.61E-31	1.42E-28	1.81E-26	1.19E-24	4.21E-23	9.83E-22	
	1	9	283866	35.14E0	60.57E8	0.	1.10E-37	8.19E-35	2.23E-32	2.04E-30	2.01E-28	
	2	9	298289	36.98E2	44.31E8	0.	0.	8.41E-37	3.04E-34	5.01E-32	4.34E-30	
	3	3	343303	42.56E0	0.	0.	0.	0.	0.	4.09E-37	3.51E-35	
	4	12	268899	33.33E4	0.	0.	9.26E-39	1.40E-35	6.86E-33	1.39E-30	7.74E-27	
2s 2p ³ P ^o	0	84	380000*	47.11E8	0.	0.	0.	0.	0.	0.	0.	
	1	24	343043	42.53E8	0.	0.	0.	0.	0.	0.	0.	
	2	72	370399	45.92E4	0.	0.	0.	0.	0.	0.	0.	
	3	120	398904	49.45E5	0.	0.	0.	0.	0.	0.	0.	
	4	384	448160**	55.56E3	0.	0.	0.	0.	0.	0.	0.	
2s 2p ¹ P ^o	0	20	398700**	49.43E2	0.	0.	0.	0.	0.	0.	0.	
	1	60	425060**	52.69E9	0.	0.	0.	0.	0.	0.	0.	
	2	100	454030**	56.28E4	0.	0.	0.	0.	0.	0.	0.	
	3	320	503000*	62.36E4	0.	0.	0.	0.	0.	0.	0.	
	4	108	491000*	60.87E7	0.	0.	0.	0.	0.	0.	0.	
2p ³ P	0	192	557000*	69.15E4	0.	0.	0.	0.	0.	0.	0.	
	1	36	475000*	58.89E0	0.	0.	0.	0.	0.	0.	0.	
	2	64	540000*	66.94E7	0.	0.	0.	0.	0.	0.	0.	
	3	72	542000*	67.19E7	0.	0.	0.	0.	0.	0.	0.	
	4	128	607000*	75.25E5	0.	0.	0.	0.	0.	0.	0.	
2p ¹ P	0	180	546000*	70.17E2	0.	0.	0.	0.	0.	0.	0.	
	1	320	431000*	78.23E0	0.	0.	0.	0.	0.	0.	0.	
	2	108	600000*	74.38E6	0.	0.	0.	0.	0.	0.	0.	
	3	192	665000*	82.44E4	0.	0.	0.	0.	0.	0.	0.	
	4	192	665000*	82.44E4	0.	0.	0.	0.	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949) AND BOWEN (1955)

TABLE 57 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O++

LEVEL	TEMPERATURE (DEG K)											
	6000	7200	7400	8000	8400	8800	9200	9600	10000	11000	12000	13000
1CM-1)												
0	1.13E-01	1.12E-01	1.14E-01	1.13E-01	1.13E-01	1.13E-01	1.12E-01	1.12E-01	1.11E-01	1.10E-01	1.08E-01	1.07E-01
113	3.37E-01	3.34E-01	3.35E-01	3.34E-01	3.34E-01	3.34E-01	3.30E-01	3.28E-01	3.28E-01	3.21E-01	3.21E-01	3.17E-01
304	5.40E-01	5.39E-01	5.38E-01	5.38E-01	5.37E-01	5.35E-01	5.34E-01	5.33E-01	5.31E-01	5.27E-01	5.23E-01	5.17E-01
20274	7.89E-03	7.87E-03	7.85E-03	7.84E-03	7.83E-03	7.82E-03	7.81E-03	7.80E-03	7.79E-03	7.78E-03	7.77E-03	7.76E-03
43187	1.24E-05	1.23E-05	1.22E-05	1.21E-05	1.20E-05	1.19E-05	1.18E-05	1.17E-05	1.16E-05	1.15E-05	1.14E-05	1.13E-05
40312	1.45E-06	1.44E-06	1.43E-06	1.42E-06	1.41E-06	1.40E-06	1.39E-06	1.38E-06	1.37E-06	1.36E-06	1.35E-06	1.34E-06
170041	1.61E-11	1.60E-11	1.59E-11	1.58E-11	1.57E-11	1.56E-11	1.55E-11	1.54E-11	1.53E-11	1.52E-11	1.51E-11	1.50E-11
162304	8.55E-14	8.54E-14	8.53E-14	8.52E-14	8.51E-14	8.50E-14	8.49E-14	8.48E-14	8.47E-14	8.46E-14	8.45E-14	8.44E-14
170707	2.48E-19	2.47E-19	2.46E-19	2.45E-19	2.44E-19	2.43E-19	2.42E-19	2.41E-19	2.40E-19	2.39E-19	2.38E-19	2.37E-19
107049	3.73E-18	3.72E-18	3.71E-18	3.70E-18	3.69E-18	3.68E-18	3.67E-18	3.66E-18	3.65E-18	3.64E-18	3.63E-18	3.62E-18
210459	1.50E-20	1.49E-20	1.48E-20	1.47E-20	1.46E-20	1.45E-20	1.44E-20	1.43E-20	1.42E-20	1.41E-20	1.40E-20	1.39E-20
203666	8.53E-27	8.52E-27	8.51E-27	8.50E-27	8.49E-27	8.48E-27	8.47E-27	8.46E-27	8.45E-27	8.44E-27	8.43E-27	8.42E-27
208239	7.24E-28	7.23E-28	7.22E-28	7.21E-28	7.20E-28	7.19E-28	7.18E-28	7.17E-28	7.16E-28	7.15E-28	7.14E-28	7.13E-28
343303	1.70E-33	1.69E-33	1.68E-33	1.67E-33	1.66E-33	1.65E-33	1.64E-33	1.63E-33	1.62E-33	1.61E-33	1.60E-33	1.59E-33
268899	2.70E-25	2.69E-25	2.68E-25	2.67E-25	2.66E-25	2.65E-25	2.64E-25	2.63E-25	2.62E-25	2.61E-25	2.60E-25	2.59E-25
207960	1.73E-27	1.72E-27	1.71E-27	1.70E-27	1.69E-27	1.68E-27	1.67E-27	1.66E-27	1.65E-27	1.64E-27	1.63E-27	1.62E-27
327307	5.70E-30	5.69E-30	5.68E-30	5.67E-30	5.66E-30	5.65E-30	5.64E-30	5.63E-30	5.62E-30	5.61E-30	5.60E-30	5.59E-30
267400	1.99E-33	1.98E-33	1.97E-33	1.96E-33	1.95E-33	1.94E-33	1.93E-33	1.92E-33	1.91E-33	1.90E-33	1.89E-33	1.88E-33
368411	5.81E-34	5.80E-34	5.79E-34	5.78E-34	5.77E-34	5.76E-34	5.75E-34	5.74E-34	5.73E-34	5.72E-34	5.71E-34	5.70E-34
379062	1.02E-34	1.01E-34	1.00E-34	9.99E-35	9.98E-35	9.97E-35	9.96E-35	9.95E-35	9.94E-35	9.93E-35	9.92E-35	9.91E-35
380000	1.17E-34	1.16E-34	1.15E-34	1.14E-34	1.13E-34	1.12E-34	1.11E-34	1.10E-34	1.09E-34	1.08E-34	1.07E-34	1.06E-34
343043	8.30E-32	8.29E-32	8.28E-32	8.27E-32	8.26E-32	8.25E-32	8.24E-32	8.23E-32	8.22E-32	8.21E-32	8.20E-32	8.19E-32
370399	7.63E-34	7.62E-34	7.61E-34	7.60E-34	7.59E-34	7.58E-34	7.57E-34	7.56E-34	7.55E-34	7.54E-34	7.53E-34	7.52E-34
368904	3.05E-36	3.04E-36	3.03E-36	3.02E-36	3.01E-36	3.00E-36	2.99E-36	2.98E-36	2.97E-36	2.96E-36	2.95E-36	2.94E-36
440160	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
368700	5.31E-37	5.30E-37	5.29E-37	5.28E-37	5.27E-37	5.26E-37	5.25E-37	5.24E-37	5.23E-37	5.22E-37	5.21E-37	5.20E-37
425000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
454000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
503000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
491000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
537000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
475000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
540000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
542000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
607000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
544000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
631000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
600000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
645000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TABLE 57 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ga+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000
0	1.04E-01	1.05E-01	1.03E-01	1.02E-01	1.01E-01	9.97E-02	9.84E-02	9.44E-02	8.64E-02	7.71E-02
113	3.14E-01	3.10E-01	3.07E-01	3.03E-01	3.00E-01	2.97E-01	2.93E-01	2.81E-01	2.68E-01	2.54E-01
304	5.12E-01	5.07E-01	5.02E-01	4.97E-01	4.92E-01	4.87E-01	4.82E-01	4.63E-01	4.44E-01	4.24E-01
20274	6.58E-02	7.47E-02	8.34E-02	9.17E-02	9.92E-02	1.07E-01	1.15E-01	1.40E-01	1.68E-01	1.98E-01
43187	1.25E-03	1.64E-03	2.12E-03	2.64E-03	3.20E-03	3.79E-03	4.41E-03	7.09E-03	9.85E-03	1.25E-02
60312	1.08E-02	1.41E-02	1.78E-02	2.19E-02	2.64E-02	3.13E-02	3.64E-02	1.27E-02	2.94E-02	5.91E-02
120041	6.96E-04	1.57E-04	3.18E-04	5.42E-04	8.04E-04	1.09E-03	1.40E-03	1.04E-03	1.04E-03	1.04E-03
162384	4.20E-07	1.10E-06	2.94E-06	5.14E-06	8.04E-06	1.04E-05	1.34E-05	1.67E-05	2.04E-05	2.41E-05
197087	5.07E-09	1.97E-08	6.22E-08	1.74E-07	4.34E-07	9.07E-07	2.04E-06	2.04E-06	1.98E-06	1.98E-06
197089	2.37E-09	8.44E-09	2.56E-08	8.80E-08	1.42E-07	3.54E-07	7.68E-07	6.37E-06	3.33E-05	9.48E-05
210459	1.28E-10	5.36E-10	1.87E-09	5.63E-09	1.50E-08	3.50E-08	7.84E-08	9.39E-07	5.44E-06	2.83E-05
283846	2.04E-13	1.41E-12	7.62E-12	3.33E-11	1.27E-10	4.14E-10	1.20E-09	3.77E-07	2.44E-06	9.92E-06
288289	2.57E-14	1.94E-13	1.16E-12	5.94E-12	2.23E-11	7.72E-11	2.34E-10	8.04E-09	9.98E-08	6.52E-07
343303	5.03E-17	5.22E-16	4.04E-15	2.46E-14	1.22E-13	5.11E-13	1.89E-12	1.09E-10	1.72E-08	9.21E-07
248899	1.24E-12	7.88E-12	3.91E-11	1.60E-10	5.60E-10	1.72E-09	4.70E-09	1.13E-07	1.08E-06	5.64E-06
297946	1.91E-13	1.44E-12	8.58E-12	4.10E-11	1.45E-10	5.70E-10	1.74E-09	5.94E-08	7.31E-07	4.76E-06
337307	1.56E-14	1.45E-13	1.02E-12	5.71E-12	2.63E-11	1.03E-10	3.52E-10	1.70E-08	2.70E-07	2.12E-06
337400	1.42E-16	1.62E-15	1.37E-14	8.94E-14	4.74E-13	2.11E-12	8.07E-12	5.61E-10	1.15E-08	1.10E-07
348411	1.37E-16	1.69E-15	1.32E-14	1.04E-13	5.90E-13	2.79E-12	1.10E-11	8.70E-10	1.94E-08	2.01E-07
379042	7.45E-17	1.02E-15	9.74E-15	7.15E-14	4.20E-13	2.04E-12	8.49E-12	7.65E-10	1.89E-08	2.07E-07
380000	9.73E-17	1.30E-15	1.25E-14	9.24E-14	5.45E-13	2.67E-12	1.11E-11	1.01E-09	2.52E-08	2.78E-07
343043	1.24E-15	1.29E-14	9.93E-14	6.03E-13	2.99E-12	1.25E-11	4.53E-11	2.64E-09	6.81E-08	4.18E-07
370399	2.24E-16	2.80E-15	2.55E-14	1.78E-13	1.01E-12	4.79E-12	1.90E-11	1.34E-09	3.33E-08	3.17E-07
398904	1.99E-17	3.03E-16	3.27E-15	2.67E-14	1.72E-13	9.10E-13	4.64E-12	1.36E-10	1.36E-08	1.70E-07
448160	4.04E-19	8.60E-18	1.25E-16	1.32E-15	1.07E-14	6.99E-14	3.77E-13	7.78E-11	3.47E-09	5.93E-08
398700	3.39E-18	5.15E-17	5.55E-16	4.32E-15	2.91E-14	1.54E-13	6.80E-13	7.64E-11	2.39E-09	2.85E-08
425000	6.82E-17	1.24E-16	1.56E-15	1.46E-14	6.31E-14	3.12E-13	1.45E-12	4.87E-11	1.78E-09	2.62E-08
454000	5.77E-20	1.20E-18	1.92E-17	2.10E-16	1.79E-15	1.17E-14	6.45E-14	1.43E-11	4.69E-10	1.19E-08
503000	1.20E-21	3.72E-20	7.50E-19	1.06E-17	1.12E-16	9.12E-16	6.08E-15	2.42E-12	1.73E-10	4.98E-09
491000	1.39E-21	3.97E-20	7.45E-19	9.88E-18	9.83E-17	7.67E-16	4.84E-15	1.60E-12	1.00E-10	2.43E-09
557000	2.80E-24	1.24E-22	3.50E-21	6.59E-20	8.94E-19	9.20E-18	7.50E-17	5.71E-14	4.44E-12	2.22E-10
475000	2.40E-21	6.14E-20	1.05E-18	1.28E-17	1.10E-16	8.50E-16	5.13E-15	1.44E-12	8.19E-11	1.64E-09
540000	5.34E-24	2.14E-23	5.38E-21	9.24E-20	1.16E-18	1.11E-17	8.49E-17	5.27E-14	5.14E-12	2.17E-10
542000	4.91E-24	1.99E-23	5.04E-21	8.79E-20	1.11E-18	1.07E-17	5.24E-16	5.23E-14	1.64E-12	1.64E-10
607000	1.10E-26	6.92E-25	2.60E-23	6.38E-22	1.09E-20	1.39E-19	1.37E-18	1.90E-15	3.30E-13	1.54E-11
546000	1.04E-24	4.97E-23	1.44E-21	2.88E-20	4.08E-19	4.34E-18	3.68E-17	3.12E-14	3.81E-12	1.39E-10
631000	2.32E-27	1.73E-25	7.52E-24	2.09E-22	3.65E-21	5.65E-20	6.09E-19	1.13E-15	2.40E-13	1.33E-11
600000	1.90E-26	1.14E-24	4.12E-23	9.74E-22	1.62E-21	1.98E-20	1.91E-18	2.44E-15	3.99E-13	1.81E-11
645000	4.24E-29	3.98E-27	2.12E-25	7.07E-24	1.59E-22	2.58E-21	3.17E-20	8.80E-17	2.51E-14	1.73E-12
										4.61E-11
										6.34E-10

TABLE 57 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O++

LEVEL (CM-1)	TEMPERATURE (DEG F)									
	44000	48000	52000	56000	60000	64000	68000	72000	76000	80000
0	7.77E-02	7.49E-02	6.69E-02	5.38E-02	4.05E-02	2.82E-02	1.82E-02	1.11E-02	7.04E-03	0.
113	2.24E-01	2.24E-01	2.00E-01	1.61E-01	1.21E-01	8.12E-02	5.32E-02	3.32E-02	2.12E-02	0.
306	3.85E-01	3.71E-01	3.32E-01	2.82E-01	2.02E-01	1.42E-01	9.58E-02	6.32E-02	4.12E-02	0.
20274	2.00E-01	2.04E-01	2.06E-01	1.87E-01	1.51E-01	1.05E-01	6.91E-02	4.58E-02	3.02E-02	0.
43187	1.89E-02	2.05E-02	2.37E-02	2.47E-02	2.18E-02	1.51E-02	9.64E-03	6.04E-03	3.94E-03	0.
60312	5.41E-02	6.14E-02	7.07E-02	8.09E-02	9.50E-02	1.12E-01	1.32E-01	1.58E-01	1.92E-01	0.
128041	2.30E-02	2.60E-02	3.04E-02	3.61E-02	4.30E-02	5.12E-02	6.07E-02	7.17E-02	8.57E-02	0.
142384	6.65E-03	7.45E-03	8.50E-03	9.84E-03	1.14E-02	1.32E-02	1.52E-02	1.74E-02	2.00E-02	0.
197809	3.71E-04	4.11E-04	4.66E-04	5.38E-04	6.28E-04	7.38E-04	8.78E-04	1.05E-03	1.26E-03	0.
187049	8.58E-04	1.30E-03	1.77E-03	2.30E-03	2.90E-03	3.58E-03	4.38E-03	5.32E-03	6.42E-03	0.
210499	2.39E-04	4.09E-04	1.29E-03	3.64E-03	5.80E-03	8.43E-03	1.14E-02	1.58E-02	2.18E-02	0.
327307	1.85E-04	2.44E-04	1.57E-03	8.94E-03	2.19E-02	4.53E-02	8.04E-02	1.34E-01	2.14E-01	0.
327400	7.84E-04	2.00E-03	1.52E-03	1.04E-03	7.04E-04	4.84E-04	3.24E-04	2.14E-04	1.34E-04	0.
348411	1.84E-03	4.31E-03	3.21E-03	2.57E-03	2.07E-03	1.67E-03	1.32E-03	1.02E-03	7.82E-04	0.
379062	1.53E-03	5.22E-03	4.53E-03	3.53E-03	2.64E-03	1.94E-03	1.44E-03	1.04E-03	7.44E-04	0.
385000	2.62E-05	7.11E-05	4.20E-04	8.44E-03	1.44E-02	2.43E-02	4.11E-02	6.73E-02	1.03E-01	0.
238043	2.51E-05	6.15E-05	4.29E-04	2.70E-03	6.90E-03	1.55E-02	3.44E-02	7.64E-02	1.54E-01	0.
370399	3.07E-05	8.13E-05	6.68E-04	4.92E-03	1.41E-02	4.07E-02	9.64E-02	2.24E-01	5.04E-01	0.
386904	2.02E-05	5.77E-05	5.62E-04	4.94E-03	1.56E-02	5.33E-02	1.42E-01	3.74E-01	9.04E-01	0.
448160	1.29E-05	4.21E-05	5.52E-04	6.52E-03	2.46E-02	1.24E-01	4.47E-01	1.44E-01	1.42E-01	0.
398700	3.39E-04	9.67E-04	9.42E-03	8.27E-03	2.61E-03	9.23E-03	9.14E-03	8.54E-03	7.99E-03	0.
423000	4.30E-04	1.32E-03	1.50E-03	1.53E-03	5.37E-03	2.49E-02	2.41E-02	2.30E-02	2.30E-02	0.
424000	2.77E-04	9.21E-04	1.25E-03	1.53E-03	5.90E-03	3.10E-02	3.75E-02	3.74E-02	3.67E-02	0.
503000	1.79E-04	6.79E-04	1.24E-03	2.03E-03	9.32E-03	4.97E-02	1.09E-01	1.04E-01	1.19E-01	0.
491000	8.94E-07	3.28E-06	5.54E-05	8.49E-04	3.74E-03	2.57E-02	3.54E-02	3.70E-02	3.74E-02	0.
557000	1.64E-07	8.07E-07	2.93E-05	4.60E-04	2.57E-03	2.84E-02	4.94E-02	5.61E-02	6.06E-02	0.
475000	5.03E-07	1.77E-06	2.72E-05	3.77E-04	1.57E-03	9.94E-03	1.25E-02	1.28E-02	1.28E-02	0.
540000	1.07E-07	4.54E-07	1.02E-05	2.08E-04	1.10E-03	1.07E-02	1.74E-02	1.92E-02	2.08E-02	0.
542000	1.12E-07	4.74E-07	1.09E-05	2.24E-04	1.20E-03	1.18E-02	1.94E-02	2.18E-02	2.33E-02	0.
607000	2.39E-08	1.20E-07	4.03E-06	1.23E-04	8.35E-04	1.32E-02	2.78E-02	3.32E-02	3.77E-02	0.
544000	1.20E-07	5.70E-07	1.53E-05	3.67E-04	2.12E-03	2.49E-02	4.51E-02	5.15E-02	5.62E-02	0.
631000	2.72E-08	1.46E-07	3.74E-06	2.03E-04	1.48E-03	2.78E-02	6.34E-02	7.82E-02	9.11E-02	0.
609000	2.59E-08	1.29E-07	4.07E-06	1.20E-04	7.79E-04	1.17E-02	2.39E-02	2.82E-02	3.21E-02	0.
645000	3.37E-09	3.17E-08	1.52E-06	6.60E-05	5.44E-04	1.50E-02	3.31E-02	4.33E-02	5.20E-02	0.

TABLE 36. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR⁺⁺

STATE	LEVEL (CM ⁻¹)	STAT. WT.	TEMPERATURE (DEG K)									
			3200	3600	4600	4400	4800	5200	5600	6000	6400	
3s ² 3p ² 1s ²	0	5	6.83E-01	6.69E-01	6.37E-01	6.44E-01	6.37E-01	6.28E-01	6.20E-01	6.13E-01	6.06E-01	
	1112	3	2.48E-01	2.57E-01	2.64E-01	2.70E-01	2.74E-01	2.77E-01	2.80E-01	2.82E-01	2.84E-01	
	1370	1	6.74E-02	7.14E-02	7.47E-02	7.74E-02	7.94E-02	8.14E-02	8.3E-02	8.41E-02	8.51E-02	
	14010	5	1.25E-03	2.77E-03	4.72E-03	6.62E-03	9.38E-03	1.30E-02	1.70E-02	2.13E-02	2.60E-02	
	33266	1	4.36E-08	2.25E-07	8.35E-07	2.44E-06	5.95E-06	1.26E-05	2.41E-05	4.21E-05	6.85E-05	
3s 3p ³ 1s ²	114503	9	5.89E-23	1.74E-20	1.65E-18	6.81E-17	1.51E-15	2.08E-14	1.97E-13	1.80E-12	1.55E-12	
	144023	3	3.08E-29	4.03E-26	1.25E-23	1.37E-21	4.82E-20	1.84E-18	3.17E-17	3.69E-16	3.15E-15	
	169413	40	3.69E-29	6.23E-26	2.40E-23	3.13E-21	1.81E-19	5.94E-18	1.04E-16	1.59E-15	1.29E-14	
3s ² 3p ³ (5s) 3d	176739	8	3.34E-35	2.25E-31	2.58E-28	6.23E-26	1.00E-23	5.81E-22	1.09E-20	3.85E-19	5.34E-18	
	206368	24	0.	4.86E-36	1.82E-32	1.53E-29	4.17E-27	4.80E-25	2.80E-23	9.48E-22	2.07E-20	
	248377	40	0.	0.	0.	2.76E-35	2.36E-32	7.16E-30	9.58E-28	6.64E-26	2.72E-24	
	263000	56	0.	0.	0.	3.24E-37	4.13E-34	1.75E-31	3.13E-29	2.80E-27	1.42E-25	
(D ⁺) 3d	180000	100	2.64E-36	3.12E-32	5.63E-29	2.59E-26	4.28E-24	3.22E-22	1.31E-20	3.23E-19	5.33E-18	
	197480	20	0.	1.41E-34	3.72E-31	2.33E-28	4.98E-26	4.60E-24	2.79E-22	6.64E-21	1.27E-19	
	226800	60	0.	0.	2.93E-35	4.80E-32	2.28E-29	4.21E-27	3.67E-25	1.77E-23	5.22E-22	
	248600	100	0.	0.	0.	6.48E-38	1.30E-34	4.29E-32	1.24E-29	1.24E-27	6.91E-26	
(F ⁺) 3d	284000	140	0.	0.	0.	0.	1.91E-34	1.31E-33	3.53E-31	4.55E-29	3.17E-27	
	214000	60	0.	5.74E-37	2.93E-33	3.15E-30	1.04E-27	1.45E-25	9.85E-24	3.80E-22	9.29E-21	
	208000	12	0.	1.27E-36	5.97E-33	4.49E-30	1.20E-27	1.53E-25	4.20E-24	3.21E-22	1.16E-21	
	241500	36	0.	0.	8.89E-38	2.35E-34	1.67E-31	4.32E-29	5.05E-27	3.12E-25	1.15E-23	
4d	282000	60	0.	0.	0.	0.	1.49E-36	9.79E-34	2.55E-31	3.15E-29	2.13E-27	
	298000	84	0.	0.	0.	0.	0.	1.64E-35	5.84E-33	9.51E-31	6.18E-29	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM MOORE (1949) AND BOWEN (1955,1960)

TABLE 58 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar⁺⁺

LEVEL (CM ⁻¹)	TEMPERATURE (DEG K)									
	6000	7200	7600	8000	8400	8800	9200	9600	10000	11000
0	5.99E-01	5.93E-01	5.86E-01	5.80E-01	5.75E-01	5.69E-01	5.64E-01	5.59E-01	5.54E-01	5.42E-01
1112	2.04E-01	2.05E-01	2.05E-01	2.05E-01	2.05E-01	2.05E-01	2.04E-01	2.04E-01	2.03E-01	2.01E-01
1570	8.59E-02	8.66E-02	8.71E-02	8.75E-02	8.78E-02	8.81E-02	8.82E-02	8.83E-02	8.84E-02	8.85E-02
14010	3.09E-02	3.60E-02	4.13E-02	4.67E-02	5.21E-02	5.74E-02	6.30E-02	6.84E-02	7.38E-02	8.00E-02
32246	1.05E-04	1.54E-04	2.16E-04	2.93E-04	3.85E-04	4.94E-04	6.21E-04	7.64E-04	9.24E-04	1.40E-03
115303	3.38E-11	1.20E-10	4.23E-10	1.23E-09	3.25E-09	7.84E-09	1.75E-08	3.65E-08	7.18E-08	3.14E-07
144023	2.09E-14	1.13E-13	5.07E-13	1.94E-12	6.67E-12	2.03E-11	5.59E-11	1.42E-10	3.33E-10	1.01E-08
149413	8.93E-14	5.13E-13	2.44E-12	9.92E-12	3.32E-11	1.12E-10	3.21E-10	8.42E-10	2.04E-09	1.41E-08
176739	5.51E-17	4.35E-16	2.74E-15	1.44E-14	6.55E-14	2.57E-13	8.94E-13	2.80E-12	8.01E-12	7.92E-11
206368	3.13E-19	3.50E-18	3.04E-17	2.12E-16	1.23E-15	6.07E-15	2.61E-14	9.91E-14	3.30E-13	4.93E-12
249377	7.19E-23	1.32E-21	1.70E-20	1.85E-19	1.94E-18	1.05E-17	4.09E-17	3.04E-16	1.34E-15	3.37E-14
253000	4.58E-24	9.44E-23	1.56E-21	1.87E-20	1.76E-19	1.35E-18	8.66E-18	4.76E-17	2.28E-16	6.98E-15
180000	6.55E-17	5.73E-16	4.09E-15	2.40E-14	1.19E-13	5.09E-13	1.92E-12	6.48E-12	1.98E-11	2.27E-10
197480	1.71E-18	1.72E-17	1.34E-16	8.73E-16	4.69E-15	2.16E-14	8.72E-14	3.13E-13	1.01E-12	1.11E-11
226800	1.04E-20	1.48E-19	1.59E-18	1.54E-17	9.28E-17	5.37E-16	2.67E-15	1.16E-14	4.47E-14	8.51E-13
240800	2.39E-24	5.57E-23	9.31E-22	1.17E-20	1.16E-19	9.33E-19	6.24E-18	3.57E-17	1.77E-16	9.03E-15
244000	1.34E-25	3.74E-24	7.33E-23	1.07E-21	1.20E-20	1.09E-19	8.11E-19	5.12E-18	2.79E-17	1.12E-15
214000	1.54E-19	1.90E-18	1.79E-17	1.34E-16	8.31E-16	4.35E-15	1.90E-14	7.09E-14	2.82E-13	4.54E-12
208000	1.11E-19	1.26E-18	1.11E-17	7.90E-17	4.64E-16	2.32E-15	1.01E-14	3.08E-14	1.34E-13	1.94E-12
241500	2.77E-22	4.69E-21	5.89E-20	5.73E-19	4.49E-18	2.91E-17	1.61E-16	7.68E-16	3.24E-15	7.47E-14
232000	8.78E-26	2.39E-24	4.59E-23	6.54E-22	7.24E-21	6.44E-20	4.75E-19	2.94E-18	1.59E-17	1.59E-16
246000	4.16E-27	1.37E-25	3.11E-24	5.16E-23	3.56E-22	6.42E-21	5.45E-20	3.77E-19	2.23E-18	1.08E-16
										1.32E-14
										2.71E-15
										4.16E-14

TABLE 58 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Mg^{++}

LEVEL (cm^{-1})	TEMPERATURE (DEG K)											
	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000	36000	40000
0	5.13E-01	5.03E-01	4.97E-01	4.90E-01	4.84E-01	4.78E-01	4.72E-01	4.53E-01	4.30E-01	4.23E-01	4.00E-01	3.92E-01
1112	2.73E-01	2.72E-01	2.70E-01	2.68E-01	2.66E-01	2.64E-01	2.62E-01	2.54E-01	2.40E-01	2.41E-01	2.34E-01	2.26E-01
1370	6.73E-02	6.69E-02	6.64E-02	6.59E-02	6.54E-02	6.49E-02	6.44E-02	6.29E-02	6.07E-02	7.80E-02	7.07E-02	7.42E-02
14010	1.22E-01	1.32E-01	1.41E-01	1.50E-01	1.58E-01	1.65E-01	1.72E-01	1.96E-01	2.13E-01	2.25E-01	2.33E-01	2.37E-01
33266	3.36E-03	4.15E-03	5.00E-03	5.87E-03	6.78E-03	7.70E-03	8.63E-03	1.23E-02	1.58E-02	1.90E-02	2.16E-02	2.37E-02
114303	7.31E-06	1.57E-05	3.08E-05	5.55E-05	9.38E-05	1.50E-04	2.28E-04	8.62E-04	2.23E-03	4.44E-03	7.63E-03	1.16E-02
144023	1.15E-07	3.03E-07	7.08E-07	1.50E-06	2.91E-06	5.26E-06	8.97E-06	4.84E-05	1.60E-04	3.91E-04	7.75E-04	1.32E-03
149413	8.80E-07	2.41E-06	5.82E-06	1.26E-05	2.52E-05	4.66E-05	8.12E-05	4.67E-04	1.62E-03	4.09E-03	8.32E-03	1.65E-02
176739	1.04E-08	3.51E-08	9.87E-08	2.50E-07	5.67E-07	1.18E-06	2.27E-06	1.87E-05	7.96E-05	2.40E-04	5.92E-04	1.07E-03
204348	1.52E-04	6.13E-04	2.08E-03	6.12E-03	1.59E-02	3.75E-02	8.09E-02	9.22E-04	5.21E-05	1.90E-04	5.13E-04	1.13E-03
248377	3.37E-11	1.82E-10	7.94E-10	2.91E-09	9.24E-09	2.59E-08	6.37E-08	1.24E-06	1.00E-05	4.78E-05	1.60E-04	4.14E-04
243000	1.05E-11	6.26E-11	2.98E-10	1.18E-09	4.02E-09	1.20E-08	3.21E-08	7.22E-07	6.62E-06	3.47E-05	1.25E-04	3.42E-04
180000	4.17E-08	1.49E-07	4.53E-07	1.21E-06	2.88E-06	6.28E-06	1.26E-05	1.16E-04	5.58E-04	1.80E-03	4.46E-03	9.00E-03
197480	3.11E-09	1.20E-08	3.86E-08	1.08E-07	2.70E-07	6.12E-07	1.28E-06	1.31E-05	6.84E-05	2.34E-04	6.18E-04	1.29E-03
228800	4.64E-10	2.16E-09	8.29E-09	2.71E-08	7.78E-08	1.99E-07	4.65E-07	6.77E-06	4.54E-05	1.89E-04	5.47E-04	1.35E-03
268800	1.03E-11	6.43E-11	2.14E-10	1.29E-09	4.52E-09	1.38E-08	3.78E-08	9.10E-07	9.78E-06	4.77E-05	1.76E-04	4.94E-04
294000	3.03E-12	2.09E-11	1.15E-10	5.03E-10	1.88E-09	6.12E-09	1.77E-08	5.13E-07	5.63E-06	3.37E-05	1.35E-04	4.02E-04
214000	1.73E-09	7.38E-09	2.62E-08	8.02E-08	2.14E-07	5.26E-07	1.17E-06	1.44E-05	8.80E-05	3.34E-04	9.44E-04	2.14E-03
208000	6.41E-10	2.62E-09	8.99E-09	2.64E-08	6.96E-08	1.64E-07	3.60E-07	4.18E-06	2.40E-05	8.81E-05	2.40E-04	5.30E-04
241500	6.15E-11	3.16E-10	1.33E-09	4.69E-09	1.44E-08	3.93E-08	9.70E-08	1.68E-06	1.29E-05	5.86E-05	1.89E-04	4.77E-04
287000	1.60E-12	1.08E-11	5.79E-11	2.54E-10	9.43E-10	3.05E-09	8.77E-09	2.47E-07	2.67E-06	1.58E-05	6.25E-05	1.95E-04
298000	4.31E-13	3.27E-12	1.92E-11	9.17E-11	3.68E-10	1.27E-09	3.88E-09	1.33E-07	1.64E-06	1.08E-05	4.61E-05	1.44E-04

TABLE 58 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR⁺

LEVEL	TEMPERATURE (DEG K)									
	10000	20000	40000	60000	80000	100000	200000	400000	600000	1000000
10M-11	0	0	0	0	0	0	0	0	0	0
1112	3.74E-01	3.54E-01	2.82E-01	1.74E-01	1.09E-01	2.93E-02	1.34E-02	1.01E-02	8.11E-03	0.
1370	2.14E-01	2.09E-01	1.65E-01	1.02E-01	6.43E-02	1.75E-02	7.98E-03	6.07E-03	4.84E-03	0.
14010	7.11E-02	6.79E-02	5.43E-02	3.38E-02	2.13E-02	5.80E-03	2.64E-03	2.02E-03	1.62E-03	0.
33246	2.37E-01	2.32E-01	2.02E-01	1.35E-01	8.90E-02	2.89E-02	1.27E-02	9.81E-03	7.95E-03	0.
114303	2.52E-02	2.61E-02	2.54E-02	1.91E-02	1.35E-02	6.62E-03	2.37E-03	1.87E-03	1.55E-03	0.
154023	1.60E-02	2.07E-02	3.28E-02	4.01E-02	3.78E-02	2.32E-02	1.59E-02	1.39E-02	1.24E-02	0.
159413	2.02E-03	2.83E-03	5.34E-03	7.82E-03	8.22E-03	6.25E-03	4.77E-03	4.31E-03	3.94E-03	0.
174739	2.24E-02	3.21E-02	6.27E-02	9.47E-02	1.01E-01	8.01E-02	6.24E-02	5.67E-02	5.23E-02	0.
204348	1.84E-03	2.83E-03	6.52E-03	1.14E-02	1.31E-02	1.32E-02	1.13E-02	1.04E-02	1.01E-02	0.
248377	2.11E-03	3.49E-03	9.41E-03	2.04E-02	2.68E-02	3.19E-02	3.09E-02	2.97E-02	2.89E-02	0.
283000	8.89E-04	1.55E-03	5.85E-03	1.60E-02	2.64E-02	3.93E-02	4.37E-02	4.47E-02	4.54E-02	0.
188000	7.72E-04	1.99E-03	5.70E-03	1.72E-02	2.71E-02	4.95E-02	5.81E-02	6.09E-02	6.27E-02	0.
197480	1.60E-02	2.52E-02	6.22E-02	1.18E-01	1.48E-01	1.52E-01	1.34E-01	1.29E-01	1.24E-01	0.
226400	2.35E-03	3.80E-03	9.91E-03	1.99E-02	2.94E-02	2.83E-02	2.63E-02	2.53E-02	2.44E-02	0.
268800	2.70E-03	4.74E-03	1.47E-02	3.53E-02	5.00E-02	6.89E-02	7.09E-02	7.07E-02	7.02E-02	0.
284000	1.14E-03	2.24E-03	8.94E-03	2.77E-02	4.55E-02	8.48E-02	1.02E-01	1.07E-01	1.10E-01	0.
214000	9.71E-04	1.99E-03	8.71E-03	2.95E-02	5.12E-02	1.04E-01	1.39E-01	1.44E-01	1.51E-01	0.
208000	4.10E-03	6.95E-03	2.00E-02	4.45E-02	6.01E-02	7.55E-02	7.42E-02	7.29E-02	7.16E-02	0.
241500	9.99E-04	1.64E-03	4.62E-03	9.90E-03	1.31E-02	1.58E-02	1.52E-02	1.48E-02	1.44E-02	0.
282000	1.00E-03	1.83E-03	6.21E-03	1.63E-02	2.43E-02	3.72E-02	4.04E-02	4.09E-02	4.13E-02	0.
298000	4.44E-04	9.05E-04	3.92E-03	1.31E-02	2.26E-02	4.43E-02	5.81E-02	6.19E-02	6.49E-02	0.
	3.68E-04	7.84E-04	3.74E-03	1.37E-02	2.51E-02	5.78E-02	7.68E-02	8.34E-02	8.88E-02	0.

TABLE 59. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C 3+

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)											
			(CM-1)	(EV)	WT.	3200	3600	4000	4400	4800	5200	5600	6000	6400
1s 2s 2p	0	2	0	0.	2	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	64556	6	8.0037	0.	6	7.44E-13	1.87E-11	2.47E-10	2.04E-09	1.13E-08	5.24E-08	1.68E-07	5.48E-07	1.49E-06
	302849	2	37.5475	2	0.	0.	0.	0.	0.	0.	4.04E-37	1.61E-34	2.89E-32	2.70E-30
	320071	6	39.6827	2	0.	0.	0.	0.	0.	0.	0.	5.79E-36	1.39E-33	1.69E-31
	324886	10	40.2797	10	0.	0.	0.	0.	0.	0.	0.	2.80E-34	7.32E-34	9.53E-32
4s	401348	2	49.7595	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	408320	6	50.6239	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	410339	10	50.8742	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	410433	14	50.8859	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	220000*	2	27.2758	2	0.	6.52E-39	4.29E-35	5.72E-32	2.29E-29	3.64E-27	2.63E-25	1.23E-23	5.14E-21	4.61E-19
1s 2s 2p 3s 3p	300000*	18	37.1943	18	0.	0.	0.	0.	0.	0.	8.03E-34	3.02E-33	1.71E-31	1.54E-29
	300000*	6	37.1943	6	0.	0.	0.	0.	0.	0.	2.68E-34	1.01E-33	0.	0.
	380000*	30	47.1128	30	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.19E-36

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONSTRATED ENERGY LEVELS FROM MOORE (1949) AND BOCKASTEN (1956)

TABLE 59 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C 3+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	14000	15000	16000	17000	18000	19000	20000	24000	28000	36000
0	9.96E-01	9.94E-01	9.91E-01	9.87E-01	9.83E-01	9.79E-01	9.72E-01	9.61E-01	9.59E-01	8.15E-01
64556	3.93E-03	6.10E-03	8.94E-03	1.26E-02	1.89E-02	2.21E-02	2.80E-02	5.89E-02	9.81E-02	1.89E-01
302849	3.03E-14	2.41E-13	1.47E-12	7.29E-12	3.02E-11	1.07E-10	3.36E-10	1.32E-08	1.37E-07	4.51E-06
320071	1.55E-14	1.38E-13	9.40E-13	5.09E-12	2.28E-11	8.73E-11	2.92E-10	1.31E-08	1.43E-07	6.69E-06
324886	1.57E-14	1.49E-13	1.02E-12	5.65E-12	2.59E-11	1.01E-10	3.44E-10	1.54E-08	2.53E-07	9.35E-06
401348	1.22E-18	1.90E-17	2.10E-16	1.75E-15	1.15E-14	6.10E-14	2.81E-13	3.34E-11	9.97E-10	2.80E-08
403320	1.78E-18	2.92E-17	3.34E-16	2.91E-15	1.87E-14	1.09E-13	5.10E-13	6.60E-11	2.09E-09	2.74E-08
410339	2.41E-18	4.01E-17	4.64E-16	4.06E-15	2.80E-14	1.56E-13	7.35E-13	9.75E-11	3.14E-09	4.17E-08
410433	3.35E-18	5.56E-17	6.49E-16	5.57E-15	3.89E-14	2.17E-13	1.02E-12	1.34E-10	4.37E-09	5.81E-08
220000	1.51E-10	6.80E-10	2.54E-09	8.09E-09	2.27E-08	5.69E-08	1.30E-07	1.74E-06	1.11E-05	4.34E-05
300000	3.65E-13	2.85E-12	1.71E-11	8.35E-11	3.41E-10	1.20E-09	3.71E-09	1.31E-07	1.64E-06	1.07E-05
300000	1.22E-13	9.49E-13	5.72E-12	2.70E-11	1.14E-10	3.99E-10	1.24E-09	4.37E-08	5.44E-07	3.57E-06
380000	1.64E-16	2.21E-15	2.15E-14	1.60E-13	9.49E-13	4.67E-12	1.96E-11	1.80E-09	4.48E-08	4.89E-07
380000	1.64E-16	2.21E-15	2.15E-14	1.60E-13	9.49E-13	4.67E-12	1.96E-11	1.80E-09	4.48E-08	4.89E-07

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	44000	48000	60000	80000	100000	200000	400000	600000	1000000	8
0	7.33E-01	6.96E-01	6.03E-01	4.84E-01	3.87E-01	1.39E-01	5.48E-02	3.82E-02	2.42E-02	0.
64556	2.64E-01	3.02E-01	3.83E-01	4.54E-01	4.59E-01	2.62E-01	1.30E-01	9.81E-02	7.70E-02	0.
302849	3.66E-05	7.95E-05	4.23E-04	2.08E-03	4.96E-03	1.57E-02	1.84E-02	1.85E-02	1.82E-02	0.
320071	6.91E-05	1.42E-04	8.39E-04	4.59E-03	1.16E-02	4.17E-02	5.20E-02	5.31E-02	5.33E-02	0.
324886	8.91E-05	2.05E-04	1.23E-03	7.01E-03	1.81E-02	6.72E-02	8.52E-02	8.74E-02	8.83E-02	0.
401348	1.44E-06	4.15E-06	3.99E-05	3.55E-04	1.20E-03	7.75E-03	1.29E-02	1.44E-02	1.58E-02	0.
403320	3.49E-06	1.01E-05	1.01E-04	9.28E-04	3.24E-03	2.21E-02	2.79E-02	4.30E-02	4.70E-02	0.
410339	5.45E-06	1.58E-05	1.61E-04	1.51E-03	5.28E-03	3.43E-02	2.45E-02	7.13E-02	7.81E-02	0.
410433	7.61E-06	2.21E-05	2.24E-04	2.11E-03	7.38E-03	5.08E-02	3.77E-02	9.94E-02	1.09E-01	0.
220000	5.50E-04	9.52E-04	3.08E-03	9.25E-03	1.83E-02	2.84E-02	2.48E-02	2.53E-02	2.05E-02	0.
300000	3.62E-04	7.79E-04	4.08E-03	1.97E-02	4.65E-02	1.45E-01	1.68E-01	1.67E-01	1.65E-01	0.
300000	1.21E-04	2.60E-04	1.34E-03	4.58E-03	1.55E-02	4.82E-02	5.59E-02	5.58E-02	5.49E-02	0.
380000	4.41E-05	1.18E-04	9.97E-04	7.81E-03	2.45E-02	1.34E-01	2.10E-01	2.30E-01	2.45E-01	0.

TABLE 60 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N 3+

LEVEL	TEMPERATURE (DEG K)											
	6800	7200	7600	8000	8400	8800	9200	9600	10000	11000	12000	13000
1	0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	9.99E-01	9.97E-01	9.95E-01
	67273	5.92E-06	1.31E-05	2.65E-05	5.01E-05	8.91E-05	1.50E-04	2.43E-04	3.76E-04	5.63E-04	8.09E-04	1.04E-03
	130693	2.93E-12	1.34E-11	5.39E-11	1.64E-10	5.49E-10	1.57E-09	3.98E-09	9.33E-09	2.04E-08	4.64E-07	1.04E-06
	175596	6.58E-16	5.19E-15	3.29E-14	1.73E-13	7.40E-13	3.04E-12	1.07E-11	3.59E-11	9.59E-11	9.52E-10	6.45E-09
	188893	2.20E-17	2.02E-16	1.60E-15	8.82E-15	4.40E-14	1.94E-13	7.41E-13	2.54E-12	7.67E-12	9.30E-11	7.28E-10
	235370	2.35E-22	3.74E-21	4.43E-20	4.13E-19	3.10E-18	1.94E-17	1.03E-16	4.78E-16	1.90E-15	4.26E-14	5.53E-13
	380119	4.70E-35	6.17E-34	8.17E-33	8.17E-32	8.17E-31	4.08E-27	6.04E-26	7.29E-25	1.00E-24	1.02E-21	8.42E-20
	405575	6.46E-37	7.60E-35	5.41E-33	2.52E-31	8.11E-30	1.91E-28	3.41E-27	4.79E-26	5.45E-25	1.10E-22	9.10E-21
	422270	0.	4.51E-34	3.83E-33	2.00E-32	7.75E-31	2.07E-29	4.17E-28	6.54E-27	8.22E-26	2.04E-23	2.09E-21
	492000	0.	0.	0.	0.	1.01E-36	4.64E-35	1.53E-33	3.78E-32	7.22E-31	4.50E-28	9.54E-26
2	504474	0.	0.	0.	0.	3.57E-37	1.61E-35	6.54E-34	1.75E-32	3.60E-31	2.64E-28	4.44E-26
	512190	0.	0.	0.	0.	1.59E-37	8.55E-36	3.26E-34	9.18E-33	1.90E-31	1.60E-28	2.04E-26
	517948	0.	0.	0.	0.	0.	4.67E-36	1.85E-34	5.42E-33	1.21E-31	1.04E-28	2.90E-26
	447298	0.	0.	3.80E-36	2.08E-34	7.91E-33	2.19E-31	4.65E-29	1.24E-26	3.47E-24	5.54E-22	4.11E-20
	495000	0.	0.	0.	1.32E-35	5.99E-34	1.95E-32	4.74E-31	8.92E-30	5.40E-27	1.12E-26	1.03E-22
	504615	0.	0.	0.	0.	1.74E-36	9.85E-35	3.20E-33	8.37E-32	1.74E-30	1.30E-27	3.17E-25
	547700	0.	0.	0.	0.	0.	0.	0.	3.87E-37	1.22E-35	2.28E-32	1.22E-29
	593000	0.	0.	0.	0.	0.	0.	0.	0.	6.81E-36	1.48E-32	8.97E-30
	598000	0.	0.	0.	0.	0.	0.	0.	0.	5.29E-36	1.24E-32	7.92E-30
	598000	0.	0.	0.	0.	0.	0.	0.	0.	3.61E-36	9.00E-33	6.09E-30
2p	0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
	67273	5.92E-06	1.31E-05	2.65E-05	5.01E-05	8.91E-05	1.50E-04	2.43E-04	3.76E-04	5.63E-04	8.09E-04	1.04E-03
	130693	2.93E-12	1.34E-11	5.39E-11	1.64E-10	5.49E-10	1.57E-09	3.98E-09	9.33E-09	2.04E-08	4.64E-07	1.04E-06
	175596	6.58E-16	5.19E-15	3.29E-14	1.73E-13	7.40E-13	3.04E-12	1.07E-11	3.59E-11	9.59E-11	9.52E-10	6.45E-09
	188893	2.20E-17	2.02E-16	1.60E-15	8.82E-15	4.40E-14	1.94E-13	7.41E-13	2.54E-12	7.67E-12	9.30E-11	7.28E-10
	235370	2.35E-22	3.74E-21	4.43E-20	4.13E-19	3.10E-18	1.94E-17	1.03E-16	4.78E-16	1.90E-15	4.26E-14	5.53E-13
	380119	4.70E-35	6.17E-34	8.17E-33	8.17E-32	8.17E-31	4.08E-27	6.04E-26	7.29E-25	1.00E-24	1.02E-21	8.42E-20
	405575	6.46E-37	7.60E-35	5.41E-33	2.52E-31	8.11E-30	1.91E-28	3.41E-27	4.79E-26	5.45E-25	1.10E-22	9.10E-21
	422270	0.	4.51E-34	3.83E-33	2.00E-32	7.75E-31	2.07E-29	4.17E-28	6.54E-27	8.22E-26	2.04E-23	2.09E-21
	492000	0.	0.	0.	0.	1.01E-36	4.64E-35	1.53E-33	3.78E-32	7.22E-31	4.50E-28	9.54E-26

ESTIMATED **INCLUDES ESTIMATED SUALEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949)

TABLE 60 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N 3+

LEVEL (CM-1)	TEMPERATURE (DEG K)										32000	34000	40000
	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000			
0	9.91E-01	9.86E-01	9.79E-01	9.71E-01	9.60E-01	9.48E-01	9.33E-01	8.61E-01	7.74E-01	6.90E-01	6.10E-01	5.41E-01	
67273	8.87E-02	1.40E-02	2.08E-02	2.91E-02	3.99E-02	5.23E-02	6.64E-02	1.37E-01	2.20E-01	3.01E-01	3.73E-01	4.33E-01	
130675	4.36E-05	1.04E-05	2.31E-05	4.57E-05	8.36E-05	1.43E-04	2.31E-04	1.02E-03	2.80E-03	5.80E-03	9.87E-03	1.47E-02	
175598	1.30E-07	4.30E-07	1.22E-06	3.07E-06	6.93E-06	1.43E-05	2.74E-05	2.08E-04	8.42E-04	2.31E-03	4.92E-03	8.79E-03	
188885	1.84E-08	6.67E-08	2.06E-07	5.54E-07	1.33E-06	2.91E-06	5.86E-06	5.20E-05	2.34E-04	7.07E-04	1.61E-03	3.03E-03	
235370	3.10E-11	1.55E-10	6.29E-10	2.17E-09	6.48E-09	1.72E-08	4.13E-08	4.41E-07	4.34E-06	1.75E-05	5.01E-05	1.14E-04	
380119	4.29E-17	5.77E-16	5.60E-15	4.16E-14	2.65E-13	1.20E-12	4.87E-12	4.37E-10	1.02E-08	1.04E-07	6.18E-07	2.68E-06	
405375	9.41E-18	1.51E-16	1.70E-15	1.44E-14	9.45E-14	5.22E-13	2.59E-12	2.88E-10	8.28E-09	9.96E-08	6.48E-07	2.79E-06	
422270	2.82E-18	5.06E-17	6.32E-16	8.85E-15	4.21E-14	2.68E-13	1.60E-12	1.75E-10	7.65E-09	7.84E-08	5.72E-07	2.74E-06	
492000	4.35E-22	1.65E-20	2.39E-19	3.20E-18	3.20E-17	2.50E-16	1.95E-15	5.34E-13	3.25E-11	6.82E-10	7.04E-09	4.46E-08	
504474	3.62E-22	1.14E-20	2.34E-19	3.34E-18	3.54E-17	2.92E-16	1.94E-15	7.59E-13	5.14E-11	1.17E-09	1.28E-08	8.54E-08	
512190	2.33E-22	9.09E-21	1.95E-19	2.90E-18	3.18E-17	2.71E-16	1.86E-15	7.94E-13	5.76E-11	1.37E-09	1.57E-08	1.00E-07	
517948	2.10E-22	7.32E-21	1.62E-19	2.49E-18	2.81E-17	2.45E-16	1.72E-15	7.89E-13	6.00E-11	1.49E-09	1.73E-08	1.23E-07	
567295	1.65E-20	4.04E-19	6.61E-18	7.66E-17	6.91E-16	4.87E-15	2.82E-14	7.05E-12	3.47E-10	6.21E-09	5.67E-08	3.24E-07	
469820	4.91E-21	1.40E-19	2.62E-18	3.47E-17	3.43E-16	2.66E-15	1.67E-14	5.48E-12	5.28E-10	6.77E-09	6.92E-08	4.34E-07	
504615	1.79E-21	5.64E-20	1.15E-18	1.65E-17	1.75E-16	1.44E-15	9.61E-15	2.74E-12	2.55E-10	5.80E-09	6.38E-08	4.25E-07	
576000	2.31E-25	1.20E-23	3.76E-22	7.04E-21	1.16E-19	1.30E-18	1.13E-17	1.04E-14	1.30E-12	4.48E-11	7.34E-10	6.52E-09	
587700	2.10E-25	1.17E-23	3.94E-22	8.74E-21	1.37E-19	1.60E-18	1.44E-17	1.59E-14	2.14E-12	8.39E-11	1.38E-09	1.21E-08	
593000	2.03E-25	1.17E-23	4.08E-22	9.30E-21	1.50E-19	1.79E-18	1.64E-17	1.88E-14	2.72E-12	1.09E-10	1.87E-09	1.77E-08	
598020	1.70E-25	1.02E-23	3.64E-22	8.53E-21	1.40E-19	1.72E-18	1.63E-17	1.95E-14	2.94E-12	1.22E-10	2.14E-09	2.07E-08	

LEVEL (CM-1)	TEMPERATURE (DEG K)										0	0	0
	44000	48000	60000	80000	100000	200000	400000	600000	1000000	1000000			
0	4.81E-01	4.31E-01	3.21E-01	2.18E-01	1.61E-01	4.77E-02	1.30E-02	7.58E-03	4.80E-03	0.	0.	0.	0.
67273	4.80E-01	5.16E-01	5.75E-01	5.86E-01	5.49E-01	2.64E-01	9.18E-02	5.81E-02	3.92E-02	0.	0.	0.	0.
130675	2.01E-02	2.57E-02	4.19E-02	6.24E-02	7.34E-02	5.59E-02	2.44E-02	1.64E-02	1.19E-02	0.	0.	0.	0.
175598	1.39E-02	2.01E-02	4.28E-02	8.35E-02	1.16E-01	1.21E-01	6.22E-02	4.48E-02	3.35E-02	0.	0.	0.	0.
188885	5.00E-03	7.48E-03	1.73E-02	3.65E-02	5.30E-02	6.13E-02	3.29E-02	2.41E-02	1.83E-02	0.	0.	0.	0.
235370	2.19E-04	3.72E-04	1.13E-03	3.17E-03	5.43E-03	8.77E-03	5.57E-03	3.31E-03	3.42E-03	0.	0.	0.	0.
380119	7.69E-06	1.94E-05	1.41E-04	9.37E-04	2.71E-03	1.24E-02	1.32E-02	1.22E-02	1.11E-02	0.	0.	0.	0.
405375	1.00E-05	2.71E-05	2.30E-04	1.78E-03	5.63E-03	3.09E-02	3.63E-02	3.44E-02	3.21E-02	0.	0.	0.	0.
422270	9.49E-06	2.74E-05	2.57E-04	2.20E-03	7.39E-03	4.57E-02	5.69E-02	5.51E-02	5.23E-02	0.	0.	0.	0.
492000	1.98E-07	6.78E-07	9.65E-06	1.29E-04	5.42E-04	5.54E-03	8.86E-03	9.32E-03	9.45E-03	0.	0.	0.	0.
504474	3.95E-07	1.40E-06	2.15E-05	3.00E-04	1.34E-03	1.52E-02	2.54E-02	2.71E-02	2.79E-02	0.	0.	0.	0.
512190	5.12E-07	1.85E-06	2.87E-05	4.38E-04	2.03E-03	2.39E-02	4.12E-02	4.44E-02	4.58E-02	0.	0.	0.	0.
517948	5.94E-07	2.06E-06	3.62E-05	5.30E-04	2.61E-03	3.22E-02	5.85E-02	6.18E-02	6.38E-02	0.	0.	0.	0.
467295	1.33E-06	4.27E-06	5.23E-05	5.85E-04	2.52E-03	1.98E-02	2.90E-02	2.97E-02	2.94E-02	0.	0.	0.	0.
489800	1.92E-06	6.52E-06	9.15E-05	1.17E-03	5.03E-03	5.06E-02	8.03E-02	8.43E-02	8.54E-02	0.	0.	0.	0.
504615	1.97E-06	6.97E-06	1.07E-04	1.50E-03	6.78E-03	7.58E-02	1.27E-01	1.34E-01	1.39E-01	0.	0.	0.	0.
576000	3.81E-08	1.64E-07	3.86E-06	8.30E-05	4.89E-04	9.08E-03	1.94E-02	2.29E-02	2.51E-02	0.	0.	0.	0.
587700	7.80E-08	3.44E-07	8.75E-06	2.03E-04	2.50E-03	2.50E-02	6.65E-02	6.67E-02	7.41E-02	0.	0.	0.	0.
593000	1.09E-07	4.93E-07	1.28E-05	3.04E-04	1.90E-03	4.02E-02	9.24E-02	1.10E-01	1.23E-01	0.	0.	0.	0.
598020	1.30E-07	5.94E-07	1.59E-05	3.91E-04	2.47E-03	5.42E-02	1.27E-01	1.52E-01	1.70E-01	0.	0.	0.	0.

TABLE 61. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 3+

STATE	LEVEL (CM-1)	STAT. WT.	TEMPERATURE (DEG K)									
			3200	3600	4000	4400	4800	5200	5600	6000	6400	
2p ³ 2p ² 2p ² 2p ² 2p ²	0 386 71379 126942 164367	2 4 12 10 2	3.73E-01 6.27E-01 2.58E-14 3.04E-25 2.49E-33	3.68E-01 6.32E-01 9.02E-13 1.71E-22 1.09E-29	3.65E-01 6.35E-01 1.55E-11 2.70E-20 7.69E-27	3.62E-01 6.38E-01 1.59E-10 1.70E-18 1.65E-24	3.60E-01 6.40E-01 1.10E-09 5.37E-17 1.44E-22	3.58E-01 6.42E-01 5.48E-09 1.22E-14 6.34E-21	3.56E-01 6.44E-01 2.32E-08 1.07E-13 1.62E-19	3.54E-01 6.46E-01 7.83E-08 1.07E-13 2.70E-18	3.53E-01 6.47E-01 2.27E-07 1.12E-13 3.16E-17	
	180444 231275 255168 289021 357615	6 4 10 6 2	5.95E-36 0 0 0 0	4.88E-32 0 31.6360 35.8331 44.3375	6.61E-29 5.43E-37 9 0 0	2.41E-26 1.04E-33 1.05E-36 0 0	3.29E-24 5.67E-31 1.09E-33 2.58E-38 0	2.11E-22 1.18E-28 3.89E-31 6.00E-29 0	7.44E-21 1.11E-26 4.72E-27 5.82E-25 0	1.64E-19 5.82E-25 4.72E-27 8.45E-31 2.02E-38	2.44E-18 1.94E-23 2.16E-25 6.40E-29 4.29E-36	
	390219 419544 485823 504000* 511000**	6 10 2 6 24	0 0 0 0 0	48.3797 52.0155 60.2329 62.4864 63.3563	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	
	443945 474555 501721 590400** 555874	18 54 90 268 54	0 0 0 0 0	54.9312 58.8358 62.2039 73.1984 69.4137	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	
	646000** 617000** 721900* 636000** 740000*	96 162 288 90 160	0 0 0 0 0	82.5713 76.4963 89.5019 78.8319 91.7459	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	
2p ³ 2p ³ 2p ³ 2p ³	693000* 796000* 796000* 796000*	18 32 4 4	85.9188 98.6889 98.6889 98.6889	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0		

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949)

TABLE 61 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF D 3+

LEVEL	TEMPERATURE (DEG K)											
	6000	7200	7600	8000	8400	8800	9200	9600	10000	11000	12000	13000
0	3.52E-01	3.51E-01	3.50E-01	3.49E-01	3.48E-01	3.48E-01	3.47E-01	3.46E-01	3.45E-01	3.44E-01	3.44E-01	3.43E-01
346	6.48E-01	6.49E-01	6.50E-01	6.51E-01	6.52E-01	6.53E-01	6.54E-01	6.55E-01	6.56E-01	6.57E-01	6.58E-01	6.59E-01
71379	3.83E-07	1.34E-06	2.84E-06	5.31E-06	1.02E-05	1.78E-05	2.95E-05	4.86E-05	7.95E-05	1.28E-04	2.04E-04	3.12E-04
126922	3.81E-12	1.84E-11	6.39E-11	2.12E-10	6.28E-10	1.68E-09	4.14E-09	9.46E-09	2.02E-08	4.06E-07	4.22E-07	1.52E-06
164367	2.77E-16	1.91E-15	1.07E-14	5.06E-14	2.08E-13	7.41E-13	2.38E-12	6.93E-12	1.83E-11	1.59E-10	9.44E-10	4.31E-09
180644	2.65E-17	2.21E-16	1.47E-15	8.13E-15	3.81E-14	1.55E-13	5.40E-13	1.81E-12	5.35E-12	1.64E-11	4.04E-10	2.13E-09
231275	3.94E-22	5.95E-21	6.76E-20	6.02E-19	4.33E-18	2.63E-17	1.36E-16	6.12E-16	2.53E-15	5.02E-14	6.23E-13	5.24E-12
255168	6.27E-24	1.24E-22	1.83E-21	2.05E-20	1.82E-19	1.32E-18	8.10E-18	4.26E-17	1.97E-16	5.31E-15	8.87E-14	9.31E-13
289021	2.92E-27	8.69E-26	1.81E-24	2.79E-23	3.31E-22	3.13E-21	2.44E-20	1.60E-19	5.04E-19	1.93E-17	9.19E-16	1.32E-14
357615	4.84E-34	3.23E-32	1.38E-30	4.08E-29	8.70E-28	1.41E-26	1.78E-25	1.83E-24	1.54E-23	1.67E-21	8.21E-20	2.22E-18
390219	1.46E-36	1.43E-34	8.67E-33	3.47E-31	9.80E-30	2.04E-28	3.24E-27	4.14E-26	4.29E-25	7.03E-23	4.94E-21	1.80E-19
419544	0.	6.81E-37	5.61E-35	2.97E-33	1.08E-31	2.82E-30	5.25E-29	8.32E-28	1.03E-26	2.53E-24	2.45E-22	1.17E-20
485823	0.	0.	0.	3.95E-39	2.53E-37	1.11E-35	3.49E-34	8.27E-33	1.52E-31	8.71E-29	1.73E-26	1.52E-24
504000	0.	0.	0.	0.	3.37E-34	1.70E-34	6.11E-35	1.63E-35	3.33E-32	2.45E-29	5.84E-27	6.12E-25
511000	0.	0.	0.	0.	4.06E-38	2.17E-34	8.18E-35	2.28E-33	4.87E-32	3.86E-29	1.02E-26	1.13E-24
643545	0.	0.	1.07E-36	7.13E-35	3.17E-33	1.00E-31	2.34E-30	4.20E-29	5.99E-28	1.90E-25	2.48E-23	1.48E-21
674535	0.	0.	0.	8.09E-37	4.70E-35	1.89E-33	5.50E-32	1.21E-30	2.08E-29	1.03E-26	1.81E-24	1.43E-22
501721	0.	0.	0.	0.	7.45E-37	3.70E-35	1.31E-33	3.44E-32	6.94E-31	1.96E-28	1.14E-25	1.18E-23
559874	0.	0.	0.	0.	0.	0.	0.	0.	6.39E-36	1.44E-32	8.94E-30	2.07E-27
664000	0.	0.	0.	0.	0.	0.	8.82E-38	3.38E-34	9.84E-35	1.44E-31	6.51E-29	1.14E-26
617000	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.43E-37	3.45E-34	1.40E-31
721900	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.49E-34	2.07E-31	4.12E-29
636000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.27E-36	9.87E-34
740000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.19E-35	1.18E-32	4.15E-30
693000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.40E-35
796000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.54E-36	1.51E-33
											0.	0.

TABLE 61 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF D 3+

LEVEL	TEMPERATURE (DEG K)											
	14000	15000	16000	17000	18000	19000	20000	24000	28000	32000	36000	40000
10M-11	3.42E-01	3.41E-01	3.40E-01	3.39E-01	3.38E-01	3.37E-01	3.35E-01	3.29E-01	3.20E-01	3.10E-01	2.98E-01	2.84E-01
G	6.57E-01	6.57E-01	6.57E-01	6.56E-01	6.55E-01	6.54E-01	6.53E-01	6.49E-01	6.28E-01	6.09E-01	5.88E-01	5.65E-01
386	1.34E-03	2.17E-03	3.33E-03	4.84E-03	6.73E-03	9.08E-03	1.18E-02	1.73E-02	2.91E-02	4.91E-02	7.31E-02	1.13E-01
71379	3.69E-04	8.78E-04	1.87E-03	3.66E-03	6.62E-03	1.13E-02	1.81E-02	3.15E-02	5.15E-02	8.34E-02	1.34E-01	2.14E-01
126942	1.58E-08	4.85E-08	1.30E-07	3.08E-07	6.65E-07	1.32E-06	2.66E-06	1.73E-05	6.88E-05	1.91E-04	4.19E-04	1.75E-04
164367	8.88E-09	3.05E-08	8.99E-08	2.33E-07	5.43E-07	1.16E-06	2.70E-06	1.95E-05	8.94E-05	2.74E-04	6.55E-04	1.29E-03
180444	3.23E-11	1.58E-10	6.31E-10	2.16E-09	6.31E-09	1.67E-08	3.69E-08	6.26E-07	4.42E-06	1.89E-05	5.78E-05	1.40E-04
231275	6.94E-12	4.00E-11	1.84E-10	7.08E-10	2.31E-09	6.81E-09	1.79E-08	3.74E-07	3.24E-06	1.61E-05	5.54E-05	1.44E-04
255168	1.29E-13	9.33E-13	5.26E-12	2.42E-11	9.39E-11	3.18E-10	9.39E-10	2.93E-08	3.41E-07	2.11E-06	8.62E-06	2.62E-05
289021	3.74E-17	4.32E-16	3.67E-15	2.43E-14	1.30E-13	5.84E-13	2.25E-12	1.61E-10	3.35E-09	3.22E-08	1.85E-07	7.42E-07
337615	5.68E-17	5.88E-16	5.88E-16	4.62E-15	2.88E-14	1.48E-13	6.47E-13	6.83E-11	1.88E-09	2.27E-08	1.51E-07	6.89E-07
390219	3.22E-19	5.68E-18	7.01E-17	6.43E-16	4.61E-15	2.68E-14	1.31E-13	1.96E-11	6.95E-10	9.95E-09	7.79E-08	4.00E-07
419344	7.08E-23	1.97E-21	3.62E-20	4.71E-19	4.61E-18	3.55E-17	2.22E-16	7.39E-14	4.61E-12	1.01E-10	1.10E-09	7.37E-09
485823	3.28E-23	1.03E-21	2.12E-20	3.03E-19	3.24E-18	2.69E-17	1.80E-16	7.49E-14	5.44E-12	1.34E-10	1.40E-09	1.15E-08
504000	6.39E-23	2.11E-21	4.51E-20	6.71E-19	7.40E-18	6.33E-17	4.36E-16	1.96E-13	1.52E-11	3.91E-10	4.84E-09	3.54E-08
511000	4.91E-20	1.02E-18	1.46E-17	1.52E-16	1.22E-15	7.84E-15	4.19E-14	8.38E-12	3.64E-10	6.09E-09	5.38E-08	3.04E-07
443345	6.09E-21	1.57E-19	2.59E-18	3.30E-17	3.04E-16	2.25E-15	1.35E-14	3.92E-12	2.22E-10	4.53E-09	4.87E-08	2.98E-07
474555	6.22E-22	1.93E-20	3.90E-19	5.52E-18	5.82E-17	4.79E-16	3.19E-15	1.28E-12	9.17E-11	2.23E-09	2.63E-08	1.87E-07
501721	2.19E-25	1.25E-23	4.29E-22	9.72E-21	1.54E-19	1.86E-18	1.73E-17	2.01E-14	3.08E-12	1.32E-10	2.41E-09	2.47E-08
590400	9.47E-25	4.38E-23	1.25E-21	2.41E-20	3.35E-19	3.51E-18	2.92E-17	2.35E-14	2.77E-12	9.78E-11	1.54E-09	1.39E-08
559874	1.09E-29	2.95E-27	1.60E-25	5.39E-24	1.23E-22	2.02E-21	2.31E-20	7.22E-17	2.11E-14	1.47E-12	3.95E-11	5.42E-10
646000	8.01E-27	5.48E-25	2.21E-23	5.75E-22	1.04E-21	1.39E-19	1.44E-18	2.10E-15	4.41E-13	2.25E-11	4.72E-10	5.31E-09
617000	2.94E-31	4.16E-29	3.14E-27	1.43E-25	4.24E-24	8.80E-23	1.35E-21	7.59E-18	3.54E-15	3.57E-13	1.57E-11	2.18E-10
721900	6.32E-28	4.92E-26	2.22E-24	6.40E-23	1.27E-21	1.84E-20	2.03E-19	4.09E-16	9.24E-14	5.31E-12	1.23E-10	1.58E-09
636000	2.56E-32	4.07E-30	3.43E-28	1.71E-26	5.54E-25	1.24E-23	2.04E-22	1.42E-18	7.84E-16	8.60E-14	3.42E-12	4.31E-11
740000	3.61E-31	4.15E-29	2.64E-27	1.03E-25	2.67E-24	4.91E-23	6.74E-22	2.68E-18	9.88E-16	8.19E-14	2.52E-12	3.89E-11
693000	1.62E-35	3.78E-33	4.45E-31	2.99E-29	1.28E-27	3.57E-26	7.52E-25	9.93E-21	8.83E-18	1.42E-15	7.29E-14	1.68E-12

TABLE 61 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 3+

LEVEL	TEMPERATURE (DEG K)									
	44000	48000	52000	56000	60000	64000	68000	72000	76000	80000
1C4-11	0	0	0	0	0	0	0	0	0	0
0	2.74E-01	2.42E-01	2.28E-01	1.83E-01	1.50E-01	4.92E-02	1.08E-02	5.67E-03	3.27E-03	0.
346	5.41E-01	5.10E-01	4.52E-01	3.44E-01	2.97E-01	9.81E-02	2.17E-02	1.13E-02	6.53E-03	0.
71379	1.59E-01	1.85E-01	2.01E-01	3.03E-01	3.21E-01	1.77E-01	5.03E-02	2.87E-02	1.77E-02	0.
124942	2.14E-02	2.91E-02	5.43E-02	9.34E-02	1.20E-01	9.87E-02	3.43E-02	2.09E-02	1.34E-02	0.
164367	1.27E-03	1.90E-03	4.43E-03	9.54E-03	1.41E-02	1.51E-02	6.00E-03	3.83E-03	2.58E-03	0.
180644	2.24E-03	3.50E-03	8.99E-03	2.13E-02	3.34E-02	4.02E-02	1.70E-02	1.10E-02	7.54E-03	0.
231275	2.89E-04	5.11E-04	1.78E-03	5.73E-03	1.07E-02	1.86E-02	9.44E-03	6.52E-03	4.69E-03	0.
235168	3.24E-04	6.24E-04	2.51E-03	9.31E-03	1.90E-02	3.92E-02	2.17E-02	1.54E-02	1.13E-02	0.
289921	6.44E-05	1.34E-04	6.09E-04	3.04E-03	7.01E-03	1.85E-02	1.15E-02	8.51E-03	6.47E-03	0.
357615	2.29E-06	5.79E-06	4.30E-05	2.95E-04	8.71E-04	3.76E-03	3.00E-03	2.41E-03	1.95E-03	0.
390219	2.34E-04	6.53E-04	5.91E-05	4.53E-04	1.64E-03	8.91E-03	7.99E-03	6.68E-03	5.99E-03	0.
419544	1.51E-06	4.52E-06	4.87E-05	8.84E-04	1.79E-03	1.20E-02	1.20E-02	1.04E-02	8.94E-03	0.
485823	3.45E-08	1.24E-07	1.09E-06	2.94E-05	1.38E-04	1.49E-03	1.89E-03	1.77E-03	1.62E-03	0.
504000	5.72E-08	2.14E-07	3.84E-06	6.34E-05	3.18E-04	3.93E-03	5.31E-03	5.08E-03	4.74E-03	0.
511000	1.82E-07	7.00E-07	1.30E-05	2.24E-04	1.15E-03	1.50E-02	2.07E-02	2.00E-02	1.80E-02	0.
643545	1.24E-04	3.94E-04	4.91E-05	5.64E-04	2.28E-03	1.82E-02	1.98E-02	1.74E-02	1.55E-02	0.
674555	1.35E-06	4.40E-06	7.03E-05	9.73E-04	4.37E-03	4.37E-02	5.31E-02	4.91E-02	4.44E-02	0.
901721	9.24E-07	3.97E-06	6.11E-05	9.95E-04	4.93E-03	5.99E-02	8.03E-02	7.47E-02	7.15E-02	0.
959874	1.63E-07	7.77E-07	2.33E-05	6.48E-04	4.41E-03	1.01E-01	1.87E-01	1.98E-01	2.01E-01	0.
960000	8.29E-08	3.64E-07	9.09E-06	2.10E-04	1.28E-03	2.37E-02	3.91E-02	4.00E-02	3.94E-02	0.
960000	4.58E-09	2.69E-08	1.27E-06	5.53E-05	4.95E-04	1.96E-02	4.74E-02	5.51E-02	6.02E-02	0.
617000	3.84E-08	1.97E-07	6.03E-06	2.25E-04	1.69E-03	4.71E-02	9.55E-02	1.09E-01	1.09E-01	0.
721900	2.21E-09	1.51E-08	9.98E-07	6.07E-05	6.64E-04	3.94E-02	1.16E-01	1.45E-01	1.67E-01	0.
634000	1.15E-08	6.19E-08	8.89E-05	7.14E-04	2.28E-02	4.95E-02	5.54E-02	5.54E-02	5.89E-02	0.
740000	6.79E-10	4.87E-09	3.58E-07	2.43E-05	2.84E-04	1.92E-02	6.04E-02	7.70E-02	9.02E-02	0.
993000	3.59E-10	2.24E-09	1.74E-07	6.38E-04	4.29E-05	3.03E-03	8.07E-03	9.69E-03	1.09E-02	0.
796500	2.18E-11	1.82E-10	1.57E-08	1.78E-06	2.54E-05	2.57E-03	9.90E-03	1.35E-02	1.64E-02	0.

TABLE 42. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 3+

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)											
			3200	3400	4000	4400	4800	5200	5600	6000	6400	6800	7200	7600
3s 3p ² 3s ²	(CM-1)	WT.												
	0	4	1.06E-00	9.99E-01	9.99E-01	9.99E-01	9.94E-01	9.93E-01	9.89E-01	9.84E-01	9.78E-01	9.73E-01	9.68E-01	9.63E-01
	21167	10	1.84E-04	5.20E-04	1.21E-03	2.44E-03	4.37E-03	7.10E-03	1.07E-02	1.54E-02	2.10E-02	2.76E-02	3.52E-02	4.38E-02
	34975	6	2.22E-07	9.47E-06	5.13E-05	1.61E-04	4.18E-04	9.34E-04	1.86E-03	3.36E-03	5.65E-03	8.80E-03	1.29E-02	1.81E-02
	118128	12	2.51E-23	9.40E-21	1.00E-18	5.02E-17	1.25E-15	3.02E-14	7.46E-13	1.74E-12	4.18E-11	9.80E-11	2.22E-10	5.00E-10
3s 3p ² 3p	145968	10	7.85E-29	1.15E-25	3.94E-23	4.65E-21	2.48E-19	7.15E-18	1.20E-16	1.55E-15	1.37E-14	1.10E-13	8.80E-13	7.00E-12
	166719	6	4.18E-33	1.73E-29	1.35E-26	3.15E-24	2.96E-22	1.30E-20	3.70E-19	6.41E-18	7.75E-17	9.10E-16	1.05E-15	1.20E-14
	177833	2	9.41E-36	6.79E-32	2.77E-29	2.77E-26	3.52E-24	2.12E-22	1.10E-21	1.49E-19	2.12E-18	2.76E-17	3.52E-16	4.38E-15
	290000*	6	0.	0.	0.	0.	2.64E-38	2.11E-35	6.49E-33	9.20E-31	7.12E-29	5.00E-27	3.52E-25	2.12E-23
	206000*	90	0.	3.95E-35	1.44E-31	1.25E-28	3.42E-26	3.94E-24	2.30E-22	7.80E-21	1.70E-19	3.10E-17	5.00E-15	7.12E-13
3s 3p ² 3d	253193	18	0.	0.	0.	4.90E-36	4.91E-33	1.68E-30	2.49E-28	1.90E-26	8.38E-25	6.31E-23	4.38E-21	2.76E-19
	290069	54	0.	0.	0.	0.	2.73E-37	1.87E-34	5.74E-32	8.22E-30	6.31E-28	4.38E-26	2.76E-24	1.68E-22
	333000*	90	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	349000*	126	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	241000*	50	0.	0.	0.	2.81E-37	7.42E-34	5.27E-31	1.34E-28	1.59E-26	9.81E-25	3.61E-23	1.61E-21	5.00E-19
(D)	248159	10	0.	0.	0.	2.06E-38	3.07E-35	1.48E-32	2.96E-30	2.91E-28	1.61E-26	7.00E-24	2.76E-22	1.05E-20
	307000*	30	0.	0.	0.	0.	0.	9.58E-37	4.12E-34	7.80E-32	7.00E-30	5.00E-28	3.52E-26	2.12E-24
	44	50	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	384000*	70	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	31.6152	10	0.	0.	0.	1.53E-36	5.64E-33	5.64E-31	8.71E-29	6.83E-27	3.10E-25	9.73E-23	2.76E-21	1.05E-19
(S)	378000*	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	48.8648	32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0	0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0	0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0	0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

194

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949) AND BOWEN (1955)

TABLE 62 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar 3+

LEVEL	TEMPERATURE (DEG K)													
	(CM-1)	14090	15000	16000	17000	18000	19000	20000	24000	28000	32000	36000	40000	
0	7.59E-01	7.24E-01	6.96E-01	6.69E-01	6.44E-01	6.21E-01	6.00E-01	5.29E-01	4.74E-01	4.35E-01	4.02E-01	3.74E-01	3.47E-01	
21167	2.14E-01	2.38E-01	2.59E-01	2.79E-01	2.97E-01	3.13E-01	3.17E-01	3.72E-01	4.18E-01	4.70E-01	5.31E-01	6.07E-01	6.97E-01	
34975	3.11E-02	3.78E-02	4.49E-02	5.20E-02	5.90E-02	6.50E-02	7.07E-02	7.77E-02	1.18E-01	1.41E-01	1.73E-01	2.14E-01	2.64E-01	
118128	1.21E-05	2.61E-05	5.08E-05	9.13E-05	0.00016	0.00024	0.00034	0.00046	0.00071	0.00101	0.00136	0.00176	0.00221	
145948	5.74E-07	1.50E-06	3.47E-06	7.21E-06	1.38E-05	2.44E-05	4.13E-05	6.79E-05	0.00012	0.00019	0.00028	0.00039	0.00052	
164719	4.10E-08	1.23E-07	3.22E-07	7.47E-07	1.58E-06	3.04E-06	5.54E-06	9.29E-06	1.62E-05	2.94E-05	5.01E-05	8.44E-05	0.00013	
177833	2.74E-09	7.42E-09	2.02E-08	5.49E-08	1.47E-07	3.94E-07	1.04E-06	2.74E-06	7.07E-06	1.84E-05	4.74E-05	1.18E-04	3.04E-04	
209000	1.29E-13	3.62E-13	9.92E-13	2.70E-12	7.20E-12	1.97E-11	5.34E-11	1.44E-10	3.84E-10	1.01E-09	2.64E-09	6.84E-09	1.80E-08	
204000	1.09E-08	2.97E-08	8.11E-08	2.20E-07	6.04E-07	1.64E-06	4.44E-06	1.19E-05	3.14E-05	8.24E-05	0.00021	0.00054	0.00139	
233193	1.70E-11	4.64E-11	1.24E-10	3.34E-10	9.04E-10	2.44E-09	6.54E-09	1.74E-08	4.64E-08	1.24E-07	3.34E-07	8.94E-07	2.34E-06	
290849	1.15E-12	3.07E-12	8.11E-12	2.14E-11	5.74E-11	1.54E-10	4.14E-10	1.11E-09	2.94E-09	7.74E-09	2.04E-08	5.44E-08	1.44E-07	
393000	2.98E-16	8.11E-16	2.14E-15	5.74E-15	1.54E-14	4.14E-14	1.11E-13	2.94E-13	7.74E-13	2.04E-12	5.44E-12	1.44E-11	3.74E-11	
369000	8.04E-16	2.14E-15	5.74E-15	1.54E-14	4.14E-14	1.11E-13	2.94E-13	7.74E-13	2.04E-12	5.44E-12	1.44E-11	3.74E-11	9.64E-11	
241000	1.65E-10	4.44E-10	1.14E-09	3.04E-09	8.11E-09	2.14E-08	5.74E-08	1.54E-07	4.14E-07	1.11E-06	2.94E-06	7.74E-06	2.04E-05	
268159	2.03E-12	5.44E-12	1.44E-11	3.84E-11	1.04E-10	2.74E-10	7.20E-10	1.97E-09	5.34E-09	1.44E-08	3.74E-08	9.64E-08	2.54E-07	
307000	1.12E-13	3.04E-13	8.11E-13	2.14E-12	5.74E-12	1.54E-11	4.14E-11	1.11E-10	2.94E-10	7.74E-10	2.04E-09	5.44E-09	1.44E-08	
348000	3.55E-16	9.64E-16	2.54E-15	6.84E-15	1.84E-14	5.04E-14	1.34E-13	3.54E-13	9.44E-13	2.54E-12	6.84E-12	1.84E-11	4.94E-11	
344000	9.59E-17	2.54E-16	6.84E-16	1.84E-15	5.04E-15	1.34E-14	3.54E-14	9.44E-14	2.54E-13	6.84E-13	1.84E-12	4.94E-12	1.34E-11	
255000	7.94E-12	2.14E-11	5.74E-11	1.54E-10	4.14E-10	1.11E-09	2.94E-09	7.74E-09	2.04E-08	5.44E-08	1.44E-07	3.74E-07	9.64E-07	
378000	8.12E-17	2.14E-16	5.74E-16	1.54E-15	4.14E-15	1.11E-14	2.94E-14	7.74E-14	2.04E-13	5.44E-13	1.44E-12	3.74E-12	9.64E-12	

LEVEL	TEMPERATURE (DEG K)													
	(CM-1)	44000	48000	60000	80000	100000	200000	400000	600000	1000000	0	0	0	
0	3.50E-01	3.28E-01	3.05E-01	2.71E-01	1.93E-01	1.36E-01	3.99E-02	1.64E-02	1.18E-02	8.93E-03	0.	0.	0.	
21167	4.30E-01	4.05E-01	3.78E-01	3.40E-01	2.51E-01	1.51E-01	8.57E-02	3.79E-02	2.79E-02	2.17E-02	0.	0.	0.	
34975	1.67E-01	1.73E-01	1.74E-01	1.74E-01	1.54E-01	1.24E-01	6.65E-02	2.16E-02	1.62E-02	1.27E-02	0.	0.	0.	
118128	2.21E-02	2.85E-02	3.65E-02	4.78E-02	6.91E-02	7.66E-02	5.12E-02	3.21E-02	2.66E-02	2.24E-02	0.	0.	0.	
145948	7.40E-03	1.03E-02	1.34E-02	1.74E-02	2.44E-02	3.44E-02	5.44E-02	8.44E-02	1.24E-01	1.84E-01	0.	0.	0.	
164719	2.25E-03	3.33E-03	4.94E-03	7.44E-03	1.14E-02	1.94E-02	3.14E-02	5.14E-02	8.14E-02	0.00012	0.	0.	0.	
177833	5.22E-04	7.94E-04	1.19E-03	1.84E-03	2.84E-03	4.34E-03	6.64E-03	1.04E-02	1.54E-02	2.34E-02	0.	0.	0.	
209000	4.00E-03	6.24E-03	9.44E-03	1.44E-02	2.14E-02	3.24E-02	4.94E-02	7.44E-02	1.14E-01	1.74E-01	0.	0.	0.	
204000	9.34E-03	1.44E-02	2.14E-02	3.24E-02	4.94E-02	7.44E-02	1.14E-01	1.74E-01	2.64E-01	3.94E-01	0.	0.	0.	
233193	4.00E-04	6.24E-04	9.44E-04	1.44E-03	2.14E-03	3.24E-03	4.94E-03	7.44E-03	1.14E-02	1.74E-02	0.	0.	0.	
290849	3.59E-04	5.44E-04	8.11E-04	1.24E-03	1.94E-03	2.84E-03	4.34E-03	6.64E-03	1.04E-02	1.54E-02	0.	0.	0.	
393000	7.64E-05	1.07E-04	1.64E-04	2.44E-04	3.64E-04	5.44E-04	8.11E-04	1.24E-03	1.94E-03	2.84E-03	0.	0.	0.	
369000	6.34E-05	9.44E-05	1.44E-04	2.14E-04	3.24E-04	4.94E-04	7.44E-04	1.14E-03	1.74E-03	2.64E-03	0.	0.	0.	
241000	1.65E-03	2.44E-03	3.64E-03	5.44E-03	8.11E-03	1.24E-02	1.94E-02	2.84E-02	4.34E-02	6.64E-02	0.	0.	0.	
268159	1.34E-04	2.04E-04	3.04E-04	4.54E-04	6.84E-04	1.04E-03	1.54E-03	2.34E-03	3.54E-03	5.44E-03	0.	0.	0.	
307000	1.15E-04	1.74E-04	2.64E-04	3.94E-04	5.74E-04	8.54E-04	1.24E-03	1.94E-03	2.84E-03	4.34E-03	0.	0.	0.	
348000	2.60E-05	3.94E-05	5.74E-05	8.54E-05	1.24E-04	1.94E-04	2.84E-04	4.34E-04	6.64E-04	1.04E-03	0.	0.	0.	
344000	2.14E-05	3.24E-05	4.94E-05	7.44E-05	1.14E-04	1.74E-04	2.64E-04	3.94E-04	5.74E-04	8.54E-04	0.	0.	0.	
255000	2.09E-04	3.04E-04	4.54E-04	6.84E-04	1.04E-03	1.54E-03	2.34E-03	3.54E-03	5.44E-03	8.11E-03	0.	0.	0.	
378000	1.20E-05	1.74E-05	2.64E-05	3.94E-05	5.74E-05	8.54E-05	1.24E-04	1.94E-04	2.84E-04	4.34E-04	0.	0.	0.	

TABLE 63. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C II

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				5200	5400	6000	6400	6800	7200	7600	8000	8400	8800
1s	0	0.	1	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2s	2411244	298.9484	3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p	2556000	304.4973	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3s	2442215	305.2679	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3p	2861000	352.2300	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3d	2857000	354.2137	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4s	2858000	354.3377	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4p	2467760	370.3312	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	2939000	370.7032	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4f	2991000	370.8272	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5s	2991000	370.8272	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	LEVEL (EV)	TEMPERATURE (DEG K)									
		8800	9200	9600	10000	10400	11000	12000	13000	14000	15000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2411244	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2456000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2442215	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2861000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2857000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2858000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2467760	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2939000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2991000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONITORING ENERGY LEVELS FROM MOORE (1949) AND EDLEN (1952)

TABLE 63 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C 4+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	60000	100000
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2411244	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2454000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2462215	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2461000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2857000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2858000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2887000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2990000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2991000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2991000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2411244	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2454000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2462215	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2461000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2857000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2858000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2887000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2990000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2991000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2991000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TABLE 64. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N II

STATE	LEVEL		STAT.	TEMPERATURE (DEG K)									
	(CM-1)	(EV)		WT.	5200	5600	6000	6400	6800	7200	7600	8000	8400
1s 2s 2p	0	0.	2	1.30E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
	80637	4.9975	6	6.13E-10	3.02E-09	1.20E-08	4.02E-08	1.17E-07	3.01E-07	7.04E-07	1.51E-06	3.61E-06	
	456127	56.5511	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	477851	59.2444	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	484413	60.0590	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	
4s 4p	606343	75.1750	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	615135	76.2651	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	617908	76.6089	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	619050*	76.6265	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	
LEVEL	TEMPERATURE (DEG K)												
	(CM-1)	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000	18000	
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	
80637	5.64E-06	1.00E-05	1.69E-05	2.74E-05	7.88E-05	1.90E-04	3.99E-04	7.55E-04	9.99E-04	9.99E-04	9.99E-04	9.99E-04	
456127	4.09E-33	1.05E-31	2.09E-30	3.15E-29	1.23E-26	1.77E-24	1.19E-22	4.30E-21	9.94E-20	3.25E-03	4.74E-03	4.74E-03	
477851	3.52E-34	1.05E-32	2.37E-31	4.15E-30	2.15E-27	3.99E-25	3.23E-23	1.51E-21	3.72E-20	1.71E-17	1.64E-16	1.64E-16	
484413	2.01E-34	6.29E-33	1.48E-31	2.59E-30	1.52E-27	2.98E-25	2.60E-23	1.20E-21	3.30E-20	8.16E-18	7.70E-17	7.70E-17	
606343	0.	0.	0.	1.29E-38	3.60E-35	2.67E-32	7.17E-30	8.69E-28	5.51E-26	2.09E-24	7.60E-23	7.60E-23	
615135	0.	0.	0.	0.	3.42E-35	2.79E-32	8.13E-30	1.05E-27	7.11E-26	2.84E-24	3.32E-23	3.32E-23	
617908	0.	0.	0.	0.	3.97E-35	3.34E-32	9.96E-30	1.32E-27	9.08E-26	3.69E-24	4.07E-23	4.07E-23	
619050	0.	0.	0.	0.	5.45E-35	4.59E-32	1.37E-29	1.82E-27	1.23E-25	5.09E-24	1.36E-22	1.36E-22	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MCORE (1949) AND TILFORD (1963)

TABLE 64 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N II

LFVEL (CM-1)	TEMPERATURE (DEG K)									
	17000	20000	24000	28000	32000	36000	40000	44000	48000	52000
0	9.93E-01	9.91E-01	9.77E-01	9.59E-01	9.26E-01	8.93E-01	8.58E-01	8.23E-01	7.87E-01	7.51E-01
80637	6.64E-03	5.99E-03	5.33E-03	4.54E-03	3.62E-03	2.70E-03	1.78E-03	8.6E-04	3.3E-04	0.
456127	3.92E-16	5.54E-15	1.30E-12	5.32E-11	1.15E-09	1.08E-08	6.43E-08	2.74E-07	9.10E-07	3.03E-06
477851	5.74E-16	3.50E-15	1.76E-12	6.71E-11	1.30E-09	1.36E-08	8.83E-08	4.04E-07	1.42E-06	5.21E-06
484413	5.82E-16	3.64E-15	1.19E-12	7.39E-11	1.61E-09	1.75E-08	1.18E-07	5.43E-07	1.95E-06	7.41E-06
606343	1.14E-20	1.13E-19	1.60E-16	2.31E-14	1.34E-12	2.67E-11	2.90E-10	2.02E-09	1.01E-08	3.38E-07
615135	1.75E-20	1.80E-19	2.83E-16	5.14E-14	2.70E-12	5.64E-11	6.33E-10	4.54E-09	2.32E-08	8.21E-07
617938	2.37E-20	2.43E-19	3.97E-16	7.75E-14	3.98E-12	8.41E-11	9.55E-10	6.91E-09	3.57E-08	1.78E-07
618050	3.24E-20	4.06E-19	5.54E-16	1.08E-13	5.64E-12	1.17E-10	1.33E-09	9.63E-09	4.97E-08	1.79E-07

LFVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	800000	1000000	1200000	1400000	1600000	1800000	2000000
0	3.17E-01	1.52E-01	1.00E-01	6.77E-02	4.88E-02	3.41E-02	2.41E-02	1.73E-02	1.26E-02	8.9E-03
80157	5.32E-01	3.40E-01	2.48E-01	1.31E-01	8.38E-02	5.52E-02	3.52E-02	2.24E-02	1.40E-02	8.6E-03
456127	1.19E-02	2.94E-02	3.36E-02	3.51E-02	3.52E-02	3.45E-02	3.42E-02	3.47E-02	3.47E-02	3.47E-02
477851	3.03E-02	8.14E-02	9.54E-02	1.02E-01	1.04E-01	1.04E-01	1.04E-01	1.04E-01	1.04E-01	1.04E-01
484413	4.86E-02	1.33E-01	1.57E-01	1.69E-01	1.72E-01	1.73E-01	1.73E-01	1.73E-01	1.73E-01	1.73E-01
606343	4.04E-03	1.71E-02	2.34E-02	2.81E-02	3.16E-02	3.31E-02	3.36E-02	3.36E-02	3.36E-02	3.36E-02
615135	1.14E-02	4.98E-02	6.88E-02	8.38E-02	9.41E-02	9.89E-02	1.00E-01	1.02E-01	1.02E-01	1.02E-01
617938	1.84E-02	8.22E-02	1.14E-01	1.39E-01	1.57E-01	1.65E-01	1.65E-01	1.65E-01	1.65E-01	1.65E-01
618050	2.60E-02	1.15E-01	1.59E-01	1.93E-01	2.19E-01	2.31E-01	2.34E-01	2.34E-01	2.34E-01	2.34E-01

TABLE 65. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF D 4*

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)													
			1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
2s	1s	1	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	2s	2	1.12E-09	5.73E-09	2.35E-08	8.09E-08	2.41E-07	6.34E-07	1.51E-06	3.29E-06	6.44E-06	1.19E-05	2.19E-05	3.74E-05	6.12E-05	9.62E-05
	2p	3	2.48E-19	5.73E-18	8.70E-17	9.40E-16	7.67E-15	4.96E-14	2.64E-13	1.19E-12	4.62E-12	1.70E-11	5.42E-11	1.45E-10	3.58E-10	8.42E-10
	2d	4	1.77E-25	1.21E-23	4.73E-22	1.17E-20	1.98E-19	2.44E-18	2.32E-17	1.76E-16	1.10E-15	6.10E-15	3.10E-14	1.50E-13	6.90E-13	3.10E-12
2p	1s	1	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	2s	2	2.53E-35	7.49E-33	1.04E-30	7.77E-29	3.50E-27	1.03E-25	2.13E-24	3.25E-23	5.03E-22	7.43E-21	1.04E-20	1.45E-19	1.94E-18	2.53E-17
	2p	3	6.87E-41	2.04E-38	6.34E-36	1.98E-34	6.10E-32	1.94E-30	6.10E-28	1.94E-26	6.10E-24	1.94E-22	6.10E-20	1.94E-18	6.10E-16	1.94E-14
	2d	4	1.77E-47	5.42E-44	1.50E-41	4.10E-38	1.10E-35	2.90E-33	7.43E-31	1.94E-28	5.03E-26	1.24E-24	3.10E-22	7.43E-20	1.94E-18	5.03E-16
2d	1s	1	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	2s	2	1.12E-09	5.73E-09	2.35E-08	8.09E-08	2.41E-07	6.34E-07	1.51E-06	3.29E-06	6.44E-06	1.19E-05	2.19E-05	3.74E-05	6.12E-05	9.62E-05
	2p	3	2.48E-19	5.73E-18	8.70E-17	9.40E-16	7.67E-15	4.96E-14	2.64E-13	1.19E-12	4.62E-12	1.70E-11	5.42E-11	1.45E-10	3.58E-10	8.42E-10
	2d	4	1.77E-25	1.21E-23	4.73E-22	1.17E-20	1.98E-19	2.44E-18	2.32E-17	1.76E-16	1.10E-15	6.10E-15	3.10E-14	1.50E-13	6.90E-13	3.10E-12
2f	1s	1	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	2s	2	2.53E-35	7.49E-33	1.04E-30	7.77E-29	3.50E-27	1.03E-25	2.13E-24	3.25E-23	5.03E-22	7.43E-21	1.04E-20	1.45E-19	1.94E-18	2.53E-17
	2p	3	6.87E-41	2.04E-38	6.34E-36	1.98E-34	6.10E-32	1.94E-30	6.10E-28	1.94E-26	6.10E-24	1.94E-22	6.10E-20	1.94E-18	6.10E-16	1.94E-14
	2d	4	1.77E-47	5.42E-44	1.50E-41	4.10E-38	1.10E-35	2.90E-33	7.43E-31	1.94E-28	5.03E-26	1.24E-24	3.10E-22	7.43E-20	1.94E-18	5.03E-16
2g	1s	1	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	2s	2	2.53E-35	7.49E-33	1.04E-30	7.77E-29	3.50E-27	1.03E-25	2.13E-24	3.25E-23	5.03E-22	7.43E-21	1.04E-20	1.45E-19	1.94E-18	2.53E-17
	2p	3	6.87E-41	2.04E-38	6.34E-36	1.98E-34	6.10E-32	1.94E-30	6.10E-28	1.94E-26	6.10E-24	1.94E-22	6.10E-20	1.94E-18	6.10E-16	1.94E-14
	2d	4	1.77E-47	5.42E-44	1.50E-41	4.10E-38	1.10E-35	2.90E-33	7.43E-31	1.94E-28	5.03E-26	1.24E-24	3.10E-22	7.43E-20	1.94E-18	5.03E-16

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949)

TABLE 65 (CONT.-1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 4+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	100000
0	9.83E-01	9.77E-01	9.39E-01	9.84E-01	8.17E-01	7.45E-01	6.76E-01	6.11E-01	5.54E-01	2.14E-01
82413	1.72E-02	2.34E-02	6.04E-02	1.15E-01	2.49E-01	3.15E-01	3.14E-01	3.72E-01	4.21E-01	5.85E-01
158798	1.77E-05	3.20E-05	2.07E-04	1.94E-04	1.94E-03	3.32E-03	6.70E-03	1.02E-02	1.52E-02	6.53E-02
213929	8.15E-07	1.82E-06	2.28E-05	1.34E-04	4.89E-04	1.30E-03	2.77E-03	5.04E-03	8.18E-03	5.50E-02
231722	1.10E-07	2.81E-07	4.59E-06	2.98E-05	1.22E-04	3.54E-04	8.11E-04	1.57E-03	2.66E-03	3.81E-02
287909	3.34E-10	9.88E-10	3.00E-08	1.32E-07	1.95E-06	2.50E-06	2.15E-05	4.98E-05	9.49E-05	3.39E-03
550682	3.05E-18	2.44E-17	7.73E-14	1.82E-12	5.77E-11	8.24E-10	7.75E-09	3.70E-08	1.50E-07	5.72E-06
582501	8.22E-19	7.41E-18	7.69E-15	1.08E-12	4.74E-11	6.81E-10	6.45E-09	3.92E-08	1.74E-07	9.65E-06
656197	2.72E-19	2.86E-18	3.58E-15	7.71E-13	2.64E-11	4.82E-10	6.99E-09	3.25E-08	1.31E-07	7.20E-06
724916	5.64E-24	8.76E-24	5.02E-19	2.35E-16	2.68E-14	7.80E-13	1.29E-11	1.24E-10	8.10E-10	2.52E-05
736558	7.05E-24	1.14E-22	7.50E-19	3.87E-16	4.04E-14	1.47E-12	2.53E-11	2.54E-10	1.71E-09	4.07E-06
743379	7.01E-24	1.16E-22	8.31E-19	4.59E-16	4.27E-14	1.86E-12	3.90E-11	3.84E-10	2.31E-09	1.52E-07
749857	6.01E-24	1.02E-22	7.89E-19	4.57E-16	5.21E-14	2.01E-12	3.66E-11	3.84E-10	2.68E-09	1.84E-07
684352	1.10E-21	1.46E-20	9.28E-17	2.41E-14	1.51E-12	3.55E-11	4.96E-10	3.52E-09	1.91E-08	7.37E-07
703506	4.31E-22	2.72E-17	1.06E-14	8.97E-13	2.75E-11	4.15E-10	3.75E-09	2.31E-08	1.18E-07	5.50E-05
824280	9.19E-27	2.07E-25	3.90E-21	4.27E-18	7.86E-16	4.41E-14	1.08E-12	1.44E-11	1.24E-10	1.31E-08
833186	1.40E-26	3.27E-25	6.86E-21	8.11E-18	1.58E-15	9.27E-14	2.39E-12	3.24E-11	2.84E-10	3.17E-08
845389	9.29E-27	2.27E-25	5.40E-21	7.22E-18	1.52E-15	9.88E-14	2.52E-12	3.62E-11	3.28E-10	3.95E-08
853000	7.31E-27	1.84E-25	4.88E-21	6.94E-18	1.51E-15	9.80E-14	2.69E-12	3.95E-11	3.66E-10	4.60E-08

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	8.37E-02	2.33E-02	1.18E-02	6.39E-03	3.90E-03	3.03E-03	2.78E-03	2.59E-03	0.	0.
82413	4.16E-01	1.56E-01	8.73E-02	5.11E-02	3.31E-02	2.64E-02	2.45E-02	2.31E-02	0.	0.
158798	8.01E-02	3.94E-02	2.42E-02	1.53E-02	1.04E-02	8.58E-03	8.02E-03	7.60E-03	0.	0.
213929	1.62E-01	9.70E-02	6.37E-02	4.25E-02	3.01E-02	2.32E-02	2.38E-02	2.26E-02	0.	0.
231722	7.90E-02	5.06E-02	3.39E-02	2.29E-02	1.65E-02	1.39E-02	1.31E-02	1.25E-02	0.	0.
287909	1.04E-02	8.24E-03	5.93E-03	4.22E-03	3.17E-03	2.73E-03	2.59E-03	2.49E-03	0.	0.
550682	6.37E-03	1.28E-02	1.26E-02	1.15E-02	1.05E-02	9.93E-03	9.74E-03	9.50E-03	0.	0.
582501	1.52E-02	3.44E-02	3.51E-02	3.32E-02	3.08E-02	2.95E-02	2.90E-02	2.86E-02	0.	0.
603862	2.17E-02	5.30E-02	5.56E-02	5.36E-02	5.06E-02	4.87E-02	4.81E-02	4.75E-02	0.	0.
724916	1.82E-03	6.86E-03	8.32E-03	9.01E-03	9.27E-03	9.33E-03	9.34E-03	9.34E-03	0.	0.
736558	5.02E-03	1.97E-02	2.43E-02	2.54E-02	2.76E-02	2.79E-02	2.79E-02	2.80E-02	0.	0.
743379	7.97E-03	3.21E-02	3.98E-02	4.39E-02	4.57E-02	4.63E-02	4.65E-02	4.66E-02	0.	0.
749857	1.04E-02	4.39E-02	5.48E-02	6.09E-02	6.37E-02	6.47E-02	6.50E-02	6.52E-02	0.	0.
656197	8.95E-03	2.64E-02	2.94E-02	2.98E-02	2.92E-02	2.87E-02	2.85E-02	2.83E-02	0.	0.
684352	2.19E-02	7.15E-02	8.25E-02	6.60E-02	8.59E-02	8.52E-02	8.49E-02	8.46E-02	0.	0.
703506	3.10E-02	1.11E-01	1.31E-01	1.39E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01	0.	0.
824280	2.67E-03	1.44E-02	1.97E-02	2.34E-02	2.59E-02	2.76E-02	2.74E-02	2.76E-02	0.	0.
833186	7.52E-03	4.18E-02	5.77E-02	6.94E-02	7.72E-02	8.08E-02	8.19E-02	8.28E-02	0.	0.
845389	1.15E-02	6.67E-02	9.34E-02	1.14E-01	1.28E-01	1.34E-01	1.34E-01	1.38E-01	0.	0.
853000	1.52E-02	9.09E-02	1.28E-01	1.57E-01	1.78E-01	1.87E-01	1.90E-01	1.93E-01	0.	0.

TABLE 66. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR **

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)									
			5200	5600	6000	6400	6800	7200	7600	8000	8400	
$3s^2 3p^2$ 3P 1D 3P 1S	0	1	1.56E-01	1.34E-01	1.50E-01	1.47E-01	1.44E-01	1.41E-01	1.38E-01	1.36E-01	1.34E-01	
	765	3	3.43E-01	3.79E-01	3.74E-01	3.70E-01	3.66E-01	3.63E-01	3.59E-01	3.56E-01	3.52E-01	
	2032	5	4.50E-01	4.56E-01	4.61E-01	4.64E-01	4.67E-01	4.69E-01	4.71E-01	4.72E-01	4.73E-01	
	16301	5	8.68E-03	1.17E-02	1.50E-02	1.88E-02	2.28E-02	2.71E-02	3.16E-02	3.63E-02	4.10E-02	
	37914	1	4.39E-06	9.04E-06	1.69E-05	2.91E-05	4.71E-05	7.22E-05	1.04E-04	1.49E-04	2.02E-04	
$3s 3p^3$ 4P 2D 2P 2D	100000*	5	7.40E-13	5.34E-12	2.89E-11	1.26E-10	4.65E-10	1.48E-09	4.15E-09	1.09E-08	2.44E-08	
	121730	15	5.58E-15	6.02E-14	4.73E-13	2.87E-12	1.40E-11	5.76E-11	2.04E-10	6.33E-10	1.77E-09	
	141768	9	1.31E-17	2.10E-16	2.32E-15	1.90E-14	1.21E-13	6.30E-13	2.75E-12	1.03E-11	3.43E-11	
	191537	3	4.57E-24	1.96E-22	5.08E-21	8.76E-20	1.08E-18	1.01E-17	7.42E-17	4.47E-16	2.27E-15	
	160000*	5	4.69E-20	1.08E-18	1.63E-17	1.75E-16	1.42E-15	9.16E-15	4.84E-14	2.16E-13	8.38E-13	
$3s^2 3p^2$ 3P 1D 3P 1S	195356	3	1.59E-24	7.34E-23	2.03E-21	3.71E-20	4.87E-19	4.70E-18	3.40E-17	2.29E-16	1.18E-15	
	270000*	15	8.51E-33	1.72E-30	1.71E-28	9.57E-27	3.33E-25	7.81E-24	1.31E-22	1.66E-21	1.65E-20	
	220000**	60	3.47E-26	2.61E-24	1.10E-22	2.92E-21	5.24E-20	6.82E-19	6.78E-18	5.35E-17	3.44E-16	
	294155	12	2.82E-36	9.93E-34	1.40E-31	1.37E-29	6.90E-28	2.25E-26	5.09E-25	8.41E-24	1.04E-22	
	340000*	36	0.	6.38E-30	2.11E-25	3.34E-23	2.94E-21	1.58E-23	5.53E-28	1.36E-26	2.44E-25	
$3s 3p^3$ 4P 2D 2P 2D	400000*	60	0.	0.	0.	0.	1.51E-36	1.63E-34	1.08E-32	4.67E-31	1.41E-29	
	420000*	84	0.	0.	0.	0.	0.	4.20E-36	3.42E-34	1.79E-32	6.43E-31	
	500000*	300	4.23E-35	1.55E-32	2.57E-30	2.25E-28	1.17E-26	3.69E-25	8.97E-24	1.51E-22	1.94E-21	
	380000*	60	0.	0.	0.	0.	6.97E-37	1.04E-34	4.74E-31	1.70E-29	4.54E-28	
	430000*	180	0.	0.	0.	0.	0.	1.22E-36	1.10E-34	6.35E-33	2.48E-31	
$3s 3p^3$ 4P 2D 2P 2D	500000*	300	0.	0.	0.	0.	0.	0.	0.	0.	2.57E-34	
	520000*	420	0.	0.	0.	0.	0.	0.	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949) AND BOWEN (1955)

TABLE 66 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 4+

LEVEL (CM-1)	TEMPERATURE (DEG K)										
	8000	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000
0	1.32E-01	1.30E-01	1.28E-01	1.27E-01	1.23E-01	1.17E-01	1.16E-01	1.14E-01	1.11E-01	1.09E-01	1.07E-01
765	3.49E-01	3.40E-01	3.43E-01	3.40E-01	3.33E-01	3.27E-01	3.21E-01	3.16E-01	3.11E-01	3.08E-01	3.02E-01
2032	4.73E-01	4.73E-01	4.73E-01	4.72E-01	4.70E-01	4.68E-01	4.68E-01	4.62E-01	4.58E-01	4.55E-01	4.52E-01
16301	4.59E-02	5.08E-02	5.57E-02	6.06E-02	7.28E-02	8.48E-02	9.58E-02	1.07E-01	1.17E-01	1.26E-01	1.34E-01
37914	2.68E-04	3.46E-04	4.37E-04	5.41E-04	6.62E-04	1.27E-03	1.79E-03	2.31E-03	2.93E-03	3.61E-03	4.33E-03
100000	5.23E-08	1.09E-07	1.99E-07	3.57E-07	1.28E-06	3.71E-06	9.08E-06	1.96E-05	3.80E-05	6.79E-05	1.13E-04
121730	4.49E-09	1.05E-08	2.29E-08	4.70E-08	2.24E-07	8.21E-07	2.44E-06	6.30E-06	1.62E-05	2.89E-05	5.40E-05
141768	1.02E-10	2.75E-10	6.83E-10	1.58E-09	9.77E-09	4.48E-08	1.61E-07	4.82E-07	1.25E-06	2.86E-06	5.94E-06
191537	9.93E-15	3.82E-14	1.31E-13	4.04E-13	4.85E-12	3.81E-11	2.17E-10	9.65E-10	3.51E-09	1.08E-08	2.93E-08
160000	2.87E-12	8.83E-12	2.47E-11	6.36E-11	5.00E-10	2.78E-09	1.19E-08	4.11E-08	1.20E-07	3.08E-07	7.05E-07
193356	5.32E-15	2.10E-14	7.40E-14	2.36E-13	2.94E-12	2.11E-11	1.42E-10	6.52E-10	2.43E-09	7.69E-09	2.12E-08
270000	1.37E-19	6.95E-19	5.13E-18	2.55E-17	6.47E-16	1.56E-14	1.84E-13	1.52E-12	9.45E-12	6.68E-11	1.92E-10
220000	1.59E-15	6.91E-15	3.68E-14	1.36E-13	2.34E-12	2.51E-11	1.84E-10	1.04E-09	4.58E-09	1.68E-08	5.28E-08
298155	1.07E-21	8.76E-21	6.03E-20	3.56E-19	1.70E-17	4.27E-16	6.52E-15	6.73E-14	5.08E-13	2.98E-12	1.41E-11
340000	3.42E-24	3.78E-23	3.62E-22	2.59E-21	2.15E-19	9.49E-18	1.91E-16	2.74E-15	2.75E-14	2.07E-13	1.23E-12
400000	3.13E-28	5.30E-27	7.08E-26	7.59E-25	1.40E-23	1.04E-20	4.15E-19	9.58E-18	1.45E-16	1.57E-15	1.28E-14
420000	1.67E-29	3.23E-28	4.99E-27	6.06E-26	1.31E-23	1.39E-21	6.35E-20	1.72E-18	2.59E-17	3.63E-16	3.28E-15
300000	1.97E-20	1.64E-19	1.14E-18	6.52E-18	3.35E-16	8.58E-15	1.35E-13	1.38E-12	1.64E-11	6.30E-11	3.03E-10
380000	8.24E-27	1.21E-25	1.42E-24	1.37E-23	1.91E-21	1.17E-19	3.78E-18	7.48E-17	9.89E-16	9.47E-15	6.94E-14
430000	6.96E-30	1.46E-28	2.37E-27	3.08E-26	8.28E-24	8.74E-22	4.50E-20	1.52E-18	2.45E-17	3.11E-16	3.02E-15
500000	1.24E-34	4.28E-33	1.10E-31	2.17E-30	1.46E-27	3.30E-25	3.24E-23	1.65E-21	4.56E-20	9.74E-19	1.35E-17
520000	6.61E-36	2.62E-34	7.67E-33	1.71E-31	1.49E-28	4.20E-26	4.94E-24	2.95E-22	1.02E-20	2.26E-19	3.47E-18

TABLE 66 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar ++

LEVEL (CM-1)	TEMPERATURE (DEG K)											
	13000	20000	24000	28000	32000	36000	40000	44000	48000	60000	80000	100000
0	1.04E-01	1.02E-01	9.71E-02	9.29E-02	8.94E-02	8.62E-02	8.31E-02	8.01E-02	7.70E-02	6.75E-02	5.04E-02	3.50E-02
765	2.94E-01	2.90E-01	2.78E-01	2.68E-01	2.59E-01	2.51E-01	2.43E-01	2.34E-01	2.26E-01	1.99E-01	1.50E-01	1.04E-01
2032	4.45E-01	4.42E-01	4.30E-01	4.19E-01	4.08E-01	3.97E-01	3.86E-01	3.75E-01	3.62E-01	3.21E-01	2.44E-01	1.74E-01
16201	1.51E-01	1.50E-01	1.43E-01	1.37E-01	1.31E-01	1.25E-01	1.19E-01	1.13E-01	1.07E-01	9.28E-02	7.89E-02	6.42E-02
37914	5.88E-03	6.69E-03	1.00E-02	1.32E-02	1.53E-02	1.89E-02	2.12E-02	2.32E-02	2.47E-02	2.72E-02	2.94E-02	2.07E-02
100000	2.67E-04	3.84E-04	1.21E-03	2.73E-03	4.98E-03	7.92E-03	1.14E-02	1.52E-02	1.92E-02	3.07E-02	4.19E-02	4.24E-02
121730	1.44E-04	2.41E-04	9.68E-04	2.68E-03	5.93E-03	9.77E-03	1.54E-02	2.24E-02	3.01E-02	5.44E-02	8.50E-02	9.32E-02
141768	2.03E-05	3.43E-05	1.78E-04	5.74E-04	1.37E-03	2.68E-03	4.54E-03	6.79E-03	9.89E-03	2.03E-02	3.54E-02	4.19E-02
191537	1.56E-07	3.10E-07	3.00E-06	1.48E-05	4.68E-05	1.22E-04	2.54E-04	4.50E-04	7.42E-04	2.02E-03	4.83E-03	8.82E-03
160000	2.84E-06	5.13E-06	3.31E-05	1.25E-04	3.56E-04	7.20E-04	1.32E-03	2.14E-03	3.18E-03	7.27E-03	1.42E-02	1.74E-02
193356	1.17E-07	2.42E-07	2.39E-06	1.22E-05	4.11E-05	1.05E-04	2.21E-04	4.04E-04	6.62E-04	1.87E-03	4.52E-03	6.44E-03
270000	2.05E-09	5.63E-09	1.36E-07	1.31E-06	7.16E-06	2.66E-05	7.53E-05	1.74E-04	3.53E-04	1.56E-03	5.91E-03	1.10E-02
220000	3.62E-07	8.21E-07	1.09E-05	6.87E-05	2.71E-04	7.85E-04	1.82E-03	3.61E-03	6.32E-03	2.07E-02	5.81E-02	9.04E-02
298155	1.95E-10	5.94E-10	2.01E-08	2.47E-07	1.62E-06	6.91E-06	2.19E-05	5.60E-05	1.21E-04	6.36E-04	2.89E-03	5.89E-03
340000	2.46E-11	8.78E-11	4.91E-09	8.65E-08	7.39E-07	3.89E-06	1.44E-05	4.28E-05	1.04E-04	6.99E-04	4.03E-03	9.57E-03
400000	4.36E-13	1.95E-12	2.24E-10	6.60E-09	8.29E-08	5.90E-07	2.81E-06	1.00E-05	2.87E-05	2.76E-04	2.26E-03	6.89E-03
420000	1.34E-13	6.49E-13	9.47E-11	3.31E-09	4.72E-08	3.71E-07	1.92E-06	7.32E-06	2.21E-05	2.40E-04	2.23E-03	7.14E-03
300000	4.24E-09	1.30E-08	4.50E-07	5.63E-06	3.72E-05	1.40E-04	5.13E-04	1.32E-03	2.87E-03	1.52E-02	6.89E-02	1.43E-01
360000	1.80E-12	8.23E-12	7.44E-10	1.85E-08	2.04E-07	1.31E-06	5.77E-06	1.93E-05	5.23E-05	4.64E-04	3.21E-03	9.07E-03
430000	1.55E-13	6.77E-13	1.11E-10	4.24E-09	6.46E-08	5.33E-07	2.87E-06	1.13E-05	3.50E-05	4.04E-04	3.99E-03	1.32E-02
500000	1.12E-15	7.33E-15	2.79E-12	1.94E-10	4.62E-09	5.42E-08	3.89E-07	1.91E-06	7.14E-06	1.26E-04	1.89E-03	8.04E-03
520000	3.45E-16	2.44E-15	1.10E-12	9.70E-11	2.63E-09	3.41E-08	2.63E-07	1.39E-06	5.50E-06	1.09E-04	1.84E-03	8.47E-03

TABLE 66 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 4+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	100000000	0
0	8.30E-03	2.57E-03	1.65E-03	1.11E-03	8.49E-04	7.33E-04	6.98E-04	6.71E-04	0.	0.
765	2.49E-02	7.69E-03	4.93E-03	3.40E-03	2.55E-03	2.20E-03	2.09E-03	2.01E-03	0.	0.
7037	4.09E-02	1.28E-02	8.19E-03	5.65E-03	4.24E-03	3.66E-03	3.49E-03	3.35E-03	0.	0.
16301	3.69E-02	1.21E-02	7.91E-03	5.53E-03	4.20E-03	3.65E-03	3.48E-03	3.39E-03	0.	0.
37914	6.37E-03	2.24E-03	1.50E-03	1.07E-03	8.26E-04	7.23E-04	6.92E-04	6.67E-04	0.	0.
100000	2.02E-02	8.96E-03	6.47E-03	4.91E-03	3.95E-03	3.54E-03	3.41E-03	3.31E-03	0.	0.
121740	5.19E-02	2.49E-02	1.84E-02	1.43E-02	1.17E-02	1.05E-02	1.02E-02	9.89E-03	0.	0.
141748	2.69E-02	1.39E-02	1.05E-02	8.32E-03	6.90E-03	6.27E-03	6.07E-03	5.92E-03	0.	0.
191537	6.28E-03	3.87E-03	3.12E-03	2.58E-03	2.22E-03	2.05E-03	2.00E-03	1.94E-03	0.	0.
160000	1.31E-02	7.22E-03	5.61E-03	4.50E-03	3.78E-03	3.46E-03	3.36E-03	3.28E-03	0.	0.
195356	6.11E-03	3.87E-03	3.09E-03	2.57E-03	2.21E-03	2.03E-03	2.00E-03	1.94E-03	0.	0.
270000	1.78E-02	1.44E-02	1.29E-02	1.15E-02	1.05E-02	9.98E-03	9.81E-03	9.68E-03	0.	0.
220000	1.07E-01	6.98E-02	5.83E-02	4.95E-02	4.35E-02	4.07E-02	3.97E-02	3.90E-02	0.	0.
298155	1.17E-02	1.03E-02	9.68E-03	8.86E-03	8.22E-03	7.99E-03	7.80E-03	7.71E-03	0.	0.
340000	2.59E-02	2.72E-02	2.62E-02	2.50E-02	2.39E-02	2.34E-02	2.32E-02	2.30E-02	0.	0.
400000	2.80E-02	3.66E-02	3.78E-02	3.82E-02	3.82E-02	3.81E-02	3.81E-02	3.80E-02	0.	0.
420000	3.40E-02	4.76E-02	5.05E-02	5.20E-02	5.27E-02	5.30E-02	5.30E-02	5.31E-02	0.	0.
500000	2.88E-01	2.62E-01	2.40E-01	2.21E-01	2.05E-01	1.97E-01	1.95E-01	1.93E-01	0.	0.
380000	3.24E-02	3.93E-02	3.97E-02	3.94E-02	3.88E-02	3.84E-02	3.82E-02	3.81E-02	0.	0.
430000	6.77E-02	9.85E-02	1.06E-01	1.10E-01	1.12E-01	1.13E-01	1.13E-01	1.14E-01	0.	0.
500000	6.02E-02	1.28E-01	1.49E-01	1.64E-01	1.78E-01	1.84E-01	1.84E-01	1.87E-01	0.	0.
520000	6.27E-02	1.66E-01	1.99E-01	2.25E-01	2.45E-01	2.55E-01	2.59E-01	2.61E-01	0.	0.

TABLE 67. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C 5+

STATE	LEVEL		STAT.	TEMPERATURE (DEG K)											
	(CM-1)	(EVI)		1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400
1s	0	0.	2	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2s	2963904	367.4678	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p	2964195	367.5039	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3s	3512929	435.5244	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3p	3513015	435.5471	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3d	3513090	435.5544	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4s	3705071	459.3584	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4p	3705107	459.3629	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	3705138	459.3667	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4f	3705151	459.3683	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL	TEMPERATURE (DEG K)											
	8000	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2963904	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2964195	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3512929	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3513015	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3513090	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705071	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705107	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705138	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705151	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
 NONSTARRED ENERGY LEVELS FROM GARCIA AND MACK (1965)

TABLE 57 (CONT.-1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF C 5+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	10000	20000	24000	28000	32000	36000	40000	44000	48000	50000
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2963904	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2964195	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3512929	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3513015	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3513090	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705071	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705107	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705138	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3705151	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	10000	20000	24000	28000	32000	36000	40000	44000	48000	50000
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2963904	5.49E-10	2.34E-05	8.13E-04	1.18E-02	3.59E-02	3.77E-02	7.45E-02	5.43E-02	0.	0.
2964195	1.64E-09	7.02E-05	2.44E-03	3.54E-02	1.08E-01	1.13E-01	1.10E-01	1.04E-01	0.	0.
3512929	1.06E-11	3.25E-06	2.18E-04	5.16E-03	2.42E-02	3.09E-02	3.21E-02	3.27E-02	0.	0.
3513015	3.17E-11	9.75E-06	6.54E-04	1.61E-02	7.25E-02	9.28E-02	9.63E-02	9.82E-02	0.	0.
3513090	5.29E-11	1.63E-05	1.09E-03	2.68E-02	1.21E-01	1.55E-01	1.60E-01	1.64E-01	0.	0.
3705071	2.64E-12	1.63E-06	1.37E-04	4.06E-03	2.10E-02	2.80E-02	3.26E-02	3.82E-02	0.	0.
3705107	7.97E-12	4.80E-06	4.12E-04	1.22E-02	6.31E-02	8.66E-02	9.19E-02	9.58E-02	0.	0.
3705138	1.33E-11	8.15E-06	6.87E-04	2.03E-02	1.05E-01	1.44E-01	1.53E-01	1.59E-01	0.	0.
3705151	1.86E-11	1.14E-05	9.62E-04	2.84E-02	1.57E-01	2.02E-01	2.15E-01	2.23E-01	0.	0.

TABLE 48. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N 5+

STATE	LEVEL		STAT.	TEMPERATURE (DEC K)											
	(CM-1)	(EV)		WT.	5200	5600	6000	6400	6800	7200	7600	8000	8400		
1s	0	0.	1	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00		
1s 1s	33858900	419.7843	3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 2s 1s	34480000	426.4946	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 2p	3447308	427.4007	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 3p	39900000	494.4842	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 3p	40000000	494.9158	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 3d	48110000	497.5358	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 4s	42000000	520.7202	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 4p	42020000	520.9482	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 4d	42030000	521.0921	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		
1s 4f	42030000	521.0921	28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.		

LEVEL	TEMPERATURE (DEC K)												
	(CM-1)	8000	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
33858900	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
34480000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3447308	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
39900000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
40000000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
48110000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
42000000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
42020000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
42030000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
42030000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONITORING ENERGY LEVELS FROM MOORE (1949) AND EOLEN (1952)

TABLE 408 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N 5+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	100000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
3385870	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.00E 00
3440000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.07E-26
3447308	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.35E-27
3990000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.50E-36
4708200	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.42E-26
4708300	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.45E-21
4708400	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.74E-31
4708500	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.94E-31
4708600	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.09E-31
4708700	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.68E-24
4708800	0.	0.	0.	0.	0.	0.	0.	0.	0.	6.27E-33
4708900	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.28E-26
4709000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.81E-32
4709100	0.	0.	0.	0.	0.	0.	0.	0.	0.	6.65E-26
4709200	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.97E-32
4709300	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.09E-25
4709400	0.	0.	0.	0.	0.	0.	0.	0.	0.	4.16E-32
4709500	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.53E-25

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	0.	0.
3385870	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3440000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3447308	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3990000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4708200	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4708300	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4708400	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4708500	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4708600	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4708700	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4708800	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4708900	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4709000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4709100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4709200	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4709300	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4709400	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4709500	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TABLE 69. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 5+

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)										
			5200	5600	6000	6400	6800	7200	7600	8000	8400		
1s 2s	0	0.	2	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	
	96730	11.9927	6	7.14E-12	4.83E-11	2.53E-10	1.08E-09	3.88E-09	1.21E-08	3.34E-08	8.35E-08	1.91E-07	
	640040	79.3528	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	646218	82.5984	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	676656	83.6445	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	
4s	852694	105.7181	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	863376	107.0422	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	866893	107.4783	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	867083	107.5018	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	
LEVEL	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)											
		8800	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	4.06E-07	8.08E-07	1.52E-06	2.71E-06	9.60E-06	2.74E-05	6.72E-05	1.64E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04
	0.	0.	0.	0.	4.39E-17	4.70E-16	1.72E-15	2.71E-15	2.71E-15	2.71E-15	2.71E-15	2.71E-15	2.71E-15
	646218	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	676656	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
952694	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	963376	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	966893	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	967083	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM MOORE (1949)

TABLE 69 (CONT.) 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 5+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	50000
0	9.98E-01	9.97E-01	9.91E-01	9.80E-01	9.63E-01	9.41E-01	9.15E-01	8.87E-01	8.58E-01	8.28E-01
96730	1.97E-03	2.84E-03	9.01E-03	2.74E-02	3.73E-02	5.91E-02	8.47E-02	1.13E-01	1.42E-01	1.72E-01
640040	8.91E-22	1.00E-20	2.15E-17	5.10E-15	3.04E-13	7.32E-12	9.19E-11	7.22E-10	4.00E-09	1.67E-07
666218	3.64E-22	4.58E-21	1.34E-17	3.79E-15	2.83E-13	7.71E-12	1.07E-10	9.21E-10	5.47E-09	2.07E-07
674656	3.24E-22	4.16E-21	1.35E-17	4.31E-15	3.23E-13	9.17E-12	1.32E-10	1.16E-09	7.08E-09	3.64E-07
852496	9.04E-29	2.28E-27	6.24E-23	9.14E-20	2.15E-17	1.49E-15	4.30E-14	6.90E-13	1.02E-12	1.02E-09
863376	1.21E-28	3.17E-27	9.87E-23	1.59E-19	4.00E-17	2.92E-15	8.94E-14	1.46E-12	1.40E-11	2.36E-09
866893	1.54E-28	4.11E-27	1.35E-22	2.31E-19	5.69E-17	4.22E-15	1.31E-13	2.17E-12	2.23E-11	3.62E-09
867083	2.13E-28	5.67E-27	1.84E-22	3.74E-19	7.89E-17	5.87E-15	1.83E-13	3.02E-12	3.10E-11	5.04E-09

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	800000	1000000	2000000	4000000	6000000	10000000	0
0	3.84E-01	2.15E-01	1.39E-01	8.58E-02	5.57E-02	4.41E-02	4.04E-02	3.81E-02	0.	0.
96730	5.75E-01	4.54E-01	3.30E-01	2.74E-01	1.56E-01	1.28E-01	1.19E-01	1.13E-01	0.	0.
640040	3.85E-03	2.15E-02	2.99E-02	3.42E-02	3.52E-02	3.50E-02	3.49E-02	3.47E-02	0.	0.
666218	9.58E-03	5.80E-02	8.43E-02	9.87E-02	1.03E-01	1.04E-01	1.04E-01	1.04E-01	0.	0.
674656	1.50E-02	9.51E-02	1.38E-01	1.62E-01	1.71E-01	1.73E-01	1.73E-01	1.73E-01	0.	0.
852496	8.33E-04	1.00E-02	1.60E-02	2.51E-02	3.02E-02	3.24E-02	3.31E-02	3.37E-02	0.	0.
863376	2.31E-03	2.89E-02	5.25E-02	7.43E-02	9.99E-02	9.69E-02	9.91E-02	1.01E-01	0.	0.
866893	3.74E-03	4.76E-02	8.68E-02	1.23E-01	1.49E-01	1.61E-01	1.65E-01	1.68E-01	0.	0.
867083	5.26E-03	6.66E-02	1.22E-01	1.72E-01	2.09E-01	2.26E-01	2.31E-01	2.35E-01	0.	0.

TABLE 70. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 5+

[illegible]

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM MOORE (1949) AND FANCETT ET AL. (1961)

TABLE 70 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 5+

LEVEL	TEMPERATURE (DEG K)												
	(CM-1)	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
1470	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	9.99E-01
210631	6.34E-16	2.97E-15	1.22E-14	4.49E-14	7.69E-13	8.20E-12	6.08E-11	3.38E-10	1.50E-09	5.51E-09	1.74E-08	4.02E-08	6.85E-08
101294	1.64E-07	3.32E-07	6.37E-07	1.16E-06	4.28E-06	1.27E-05	3.19E-05	7.01E-05	1.39E-04	2.53E-04	4.29E-04	6.85E-04	1.07E-03
137536	8.24E-10	2.09E-09	4.91E-09	1.08E-08	5.98E-08	2.50E-07	8.36E-07	2.36E-06	5.78E-06	1.27E-05	2.54E-05	4.70E-05	7.39E-05
183112	1.27E-13	4.60E-13	1.50E-12	4.47E-12	4.81E-11	3.48E-10	1.86E-09	7.81E-09	2.71E-08	8.04E-08	2.11E-07	4.94E-07	7.39E-07
169801	3.72E-13	1.23E-12	3.68E-12	1.01E-11	9.14E-11	5.72E-10	2.70E-09	1.02E-08	3.24E-08	8.89E-08	2.14E-07	4.78E-07	7.39E-07
315000	8.19E-21	7.61E-21	5.87E-20	3.35E-19	2.32E-17	7.08E-16	1.28E-14	1.32E-13	1.30E-12	8.54E-12	4.48E-11	1.94E-10	3.05E-09
170000	3.40E-26	6.64E-25	5.15E-24	4.89E-23	5.81E-21	3.23E-18	9.64E-16	1.76E-14	2.27E-13	2.02E-12	1.42E-11	8.04E-11	1.27E-10
270000	2.85E-18	1.93E-18	1.11E-17	5.54E-17	1.86E-15	3.67E-14	4.13E-13	3.65E-12	2.17E-11	1.09E-10	4.99E-10	1.59E-09	2.54E-09
342236	2.10E-23	2.37E-24	2.18E-23	1.69E-22	1.45E-20	5.97E-19	1.38E-17	2.05E-16	2.12E-15	1.63E-14	5.90E-14	4.91E-13	7.39E-13
410000	9.81E-30	1.79E-28	2.56E-27	2.97E-26	6.21E-24	5.34E-22	2.31E-20	5.84E-19	9.59E-18	1.11E-16	9.63E-16	6.57E-15	1.07E-14
454700	1.08E-32	2.71E-31	5.19E-30	7.47E-29	2.96E-26	4.14E-24	2.71E-22	9.75E-21	2.18E-19	3.30E-18	3.62E-17	3.05E-16	4.02E-15
460000	6.45E-33	1.68E-31	5.33E-30	5.20E-29	2.09E-26	3.10E-24	2.13E-22	7.99E-21	1.88E-19	2.89E-18	3.26E-17	2.82E-16	3.62E-15
469000	2.54E-33	7.04E-32	1.48E-30	2.44E-29	1.11E-26	1.81E-24	1.35E-22	5.43E-21	1.34E-19	2.20E-18	2.61E-17	2.35E-16	3.05E-15
540000	0.	5.18E-36	1.06E-34	2.68E-33	3.07E-30	1.09E-27	1.56E-25	1.10E-23	4.42E-22	1.12E-20	1.93E-19	2.42E-18	3.62E-17
590000	0.	0.	4.41E-37	1.42E-35	2.74E-32	1.50E-29	3.11E-27	3.02E-25	1.59E-23	5.10E-22	1.09E-20	1.65E-19	2.54E-18
600000	0.	0.	0.	1.12E-36	2.80E-33	1.91E-30	4.77E-28	5.41E-26	3.27E-24	1.18E-22	2.80E-21	4.67E-20	7.39E-19
420000	4.78E-29	9.37E-28	1.43E-26	4.20E-25	4.20E-23	4.02E-21	1.91E-19	5.22E-18	9.18E-17	1.13E-15	1.03E-14	7.39E-14	1.07E-13
600000	0.	0.	0.	1.99E-37	5.00E-34	3.41E-31	8.51E-29	9.64E-27	5.89E-25	2.11E-23	5.00E-22	8.34E-21	1.27E-20
670000	0.	0.	0.	0.	1.58E-37	2.32E-34	1.10E-31	2.18E-29	2.12E-27	1.17E-25	4.01E-24	9.29E-23	1.42E-21
710000	0.	0.	0.	0.	0.	3.19E-36	2.20E-33	5.95E-31	7.43E-29	5.34E-27	2.26E-25	6.33E-24	1.07E-22
730000	0.	0.	0.	0.	0.	4.06E-37	3.36E-34	1.07E-31	1.57E-29	1.24E-27	5.83E-26	1.79E-24	2.54E-23

TABLE 70 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 5+

LEVEL	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	50000
(CM-1)										
1470	9.99E-01	9.98E-01	9.94E-01	9.96E-01	9.73E-01	9.55E-01	9.32E-01	9.04E-01	8.74E-01	7.70E-01
218631	1.20E-07	2.73E-07	1.68E-06	2.14E-05	9.32E-05	2.71E-04	6.29E-04	1.24E-03	2.17E-03	7.03E-03
101244	1.04E-03	1.52E-03	5.01E-03	1.17E-02	2.15E-02	3.54E-02	5.14E-02	6.92E-02	8.77E-02	1.41E-01
132530	4.15E-05	1.34E-04	6.41E-04	1.35E-03	4.44E-03	8.44E-03	1.39E-02	2.07E-02	2.84E-02	5.34E-02
183112	1.06E-06	2.11E-06	1.85E-05	9.72E-05	2.76E-04	6.72E-04	1.39E-03	2.38E-03	3.77E-03	9.69E-03
169801	9.69E-07	1.83E-06	1.37E-05	5.76E-05	1.68E-04	3.81E-04	7.29E-04	1.23E-03	1.87E-03	4.13E-03
319000	7.32E-10	2.40E-09	1.02E-07	1.69E-06	1.10E-05	5.18E-05	1.77E-04	4.78E-04	1.04E-03	3.17E-02
319000	3.79E-12	1.53E-11	1.26E-09	2.34E-08	3.10E-07	1.32E-06	6.19E-06	2.64E-05	6.94E-05	5.94E-04
270000	4.91E-09	1.36E-08	3.38E-07	1.34E-06	1.85E-05	6.95E-05	1.98E-04	4.53E-04	9.30E-04	4.10E-03
347286	2.06E-12	7.48E-12	4.44E-10	8.15E-09	7.18E-08	3.87E-07	1.67E-06	4.34E-06	1.07E-05	7.25E-05
410000	3.66E-14	1.72E-13	2.30E-11	7.53E-10	1.03E-08	7.74E-08	1.87E-07	1.43E-06	4.20E-06	4.29E-05
444740	2.08E-15	1.14E-14	2.61E-12	1.26E-10	2.20E-09	2.15E-08	1.29E-07	5.50E-07	1.83E-06	2.44E-05
460000	1.94E-15	1.19E-14	2.67E-12	1.19E-10	2.53E-09	2.45E-08	1.49E-07	6.96E-07	2.19E-06	3.02E-05
460000	1.68E-15	9.87E-15	2.67E-12	1.45E-10	2.89E-09	2.93E-08	1.85E-07	7.29E-07	2.87E-06	4.17E-05
540000	2.33E-17	1.79E-16	1.14E-13	1.14E-11	3.56E-10	5.15E-09	4.32E-08	2.44E-07	1.02E-06	2.28E-05
540000	1.88E-18	1.68E-17	1.72E-14	2.42E-12	9.82E-11	1.73E-09	1.71E-08	1.10E-07	5.14E-07	1.15E-05
600000	5.79E-19	5.58E-18	7.27E-15	1.21E-12	5.60E-11	1.09E-09	1.17E-08	6.01E-08	3.95E-07	1.26E-05
420000	4.30E-13	2.09E-12	3.15E-10	1.15E-08	1.64E-07	1.30E-06	6.75E-06	2.57E-05	7.78E-05	8.43E-04
600000	1.03E-19	9.94E-19	1.30E-15	2.17E-13	9.99E-12	1.95E-10	2.08E-09	1.53E-08	7.04E-08	2.25E-06
670000	1.55E-21	1.94E-20	3.86E-17	1.78E-14	1.29E-12	3.57E-11	5.03E-10	4.35E-09	2.60E-08	1.26E-06
710000	1.25E-22	1.82E-21	8.88E-18	3.50E-15	3.55E-13	1.20E-11	1.94E-10	1.94E-09	1.31E-08	8.05E-07
730000	3.8E-23	6.05E-22	3.74E-18	1.90E-15	2.02E-13	7.56E-12	1.34E-10	1.43E-09	1.00E-08	6.98E-07

TABLE 70 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 5+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
1470	1.13E-01	2.97E-02	1.70E-02	1.04E-02	7.22E-03	5.94E-03	5.56E-03	5.27E-03	0.	0.
216331	3.94E-02	2.27E-02	1.69E-02	1.07E-02	7.03E-03	5.15E-03	4.80E-03	4.52E-03	0.	0.
101284	1.11E-01	4.19E-02	2.88E-02	1.93E-02	1.34E-02	1.13E-02	1.09E-02	1.04E-02	0.	0.
137930	7.36E-02	3.09E-02	2.07E-02	1.45E-02	1.09E-02	9.47E-03	8.98E-03	8.52E-03	0.	0.
183112	3.07E-02	1.55E-02	1.10E-02	8.11E-03	6.33E-03	5.56E-03	5.32E-03	5.14E-03	0.	0.
169801	1.13E-02	5.40E-03	3.79E-03	2.76E-03	2.13E-03	1.86E-03	1.78E-03	1.72E-03	0.	0.
315000	1.79E-01	1.44E-01	1.20E-01	1.01E-01	8.64E-02	7.96E-02	7.74E-02	7.56E-02	0.	0.
370000	4.00E-02	3.94E-02	3.52E-02	3.10E-02	2.77E-02	2.60E-02	2.55E-02	2.50E-02	0.	0.
270000	5.49E-02	3.77E-02	2.94E-02	2.39E-02	1.98E-02	1.80E-02	1.74E-02	1.69E-02	0.	0.
342286	3.26E-03	2.91E-03	2.51E-03	2.15E-03	1.88E-03	1.75E-03	1.71E-03	1.67E-03	0.	0.
410000	6.09E-03	6.83E-03	6.39E-03	5.84E-03	5.38E-03	5.13E-03	5.04E-03	4.97E-03	0.	0.
454790	7.25E-03	9.69E-03	9.57E-03	9.15E-03	8.68E-03	8.41E-03	8.31E-03	8.24E-03	0.	0.
460000	9.77E-03	1.33E-02	1.32E-02	1.21E-02	1.21E-02	1.17E-02	1.16E-02	1.15E-02	0.	0.
449000	1.57E-02	2.21E-02	2.22E-02	2.15E-02	2.06E-02	2.01E-02	1.99E-02	1.97E-02	0.	0.
540000	2.89E-02	5.14E-02	5.62E-02	5.81E-02	5.88E-02	5.87E-02	5.86E-02	5.86E-02	0.	0.
560000	3.53E-02	7.41E-02	8.51E-02	9.17E-02	9.52E-02	9.65E-02	9.68E-02	9.71E-02	0.	0.
600000	4.28E-02	9.64E-02	1.14E-01	1.29E-01	1.31E-01	1.34E-01	1.35E-01	1.35E-01	0.	0.
620000	1.40E-01	1.65E-01	1.56E-01	1.44E-01	1.33E-01	1.28E-01	1.26E-01	1.24E-01	0.	0.
600400	7.65E-03	1.73E-02	2.03E-02	2.23E-02	2.35E-02	2.39E-02	2.41E-02	2.42E-02	0.	0.
670000	1.39E-02	4.02E-02	5.14E-02	6.04E-02	6.69E-02	7.00E-02	7.11E-02	7.19E-02	0.	0.
710000	1.73E-02	5.31E-02	7.79E-02	9.51E-02	1.08E-01	1.15E-01	1.17E-01	1.19E-01	0.	0.
730000	2.10E-02	7.57E-02	1.04E-01	1.29E-01	1.50E-01	1.60E-01	1.63E-01	1.64E-01	0.	0.

TABLE 71. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF R 6+

STATE	LEVEL		STAT.	TEMPERATURE (DEG K)											
	(CM-1)	(EV)		5200	5600	6000	6400	6800	7200	7600	8000	8400	8800	9200	9600
1s	0	0.	2	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2s	4034806	500.2393	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p	4035348	500.3065	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3s	4782276	592.9114	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3p	4782437	592.9313	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3d	4782575	592.9484	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4s	5043859	625.3427	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4p	5043926	625.3510	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	5043985	625.3583	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4f	5044010	625.3614	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL	TEMPERATURE (DEG K)											
	(CM-1)	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
4034806	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4035348	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782276	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782437	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782575	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043859	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043926	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5044010	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

**ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTANDARD ENERGY LEVELS FROM GARCIA AND MACK (1965)

TABLE 71 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF N 6+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	10000	20000	24000	28000	32000	36000	40000	44000	48000	100000
0	1.00E 00	1.00E 00	1.00E 00	1.30E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
4034806	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4035348	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782276	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782437	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4782575	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043859	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043926	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5043985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5044010	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	1.00E 00	1.00E 00	1.00E 00	9.68E-01	5.17E-01	1.62E-01	9.85E-02	6.44E-02	0.	0.
4034806	2.40E-13	4.90E-07	6.28E-05	2.92E-03	2.84E-02	3.81E-02	3.74E-02	3.61E-02	0.	0.
4035348	7.40E-13	1.49E-06	1.88E-04	9.74E-03	8.52E-02	1.14E-01	1.12E-01	1.08E-01	0.	0.
4782276	1.14E-15	3.30E-08	1.05E-05	9.95E-04	1.66E-02	2.91E-02	3.13E-02	3.24E-02	0.	0.
4782437	3.43E-15	1.01E-07	3.14E-05	2.98E-03	4.97E-02	8.73E-02	9.39E-02	9.72E-02	0.	0.
4782575	5.71E-15	1.69E-07	5.22E-05	4.97E-03	8.29E-02	1.45E-01	1.56E-01	1.62E-01	0.	0.
5043859	1.74E-14	1.32E-08	5.58E-06	6.63E-04	1.31E-02	2.65E-02	2.94E-02	3.12E-02	0.	0.
5043926	5.21E-16	3.90E-08	1.68E-15	2.05E-03	4.12E-02	7.94E-02	8.82E-02	9.36E-02	0.	0.
5043985	8.71E-16	6.60E-08	2.79E-05	3.41E-03	6.87E-02	1.32E-01	1.47E-01	1.56E-01	0.	0.
5044010	1.22E-15	9.24E-08	3.91E-05	4.78E-03	9.62E-02	1.85E-01	2.04E-01	2.19E-01	0.	0.

TABLE 1. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 6+

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				5200	5400	6000	6400	6800	7200	7600	8000	8400	8800
1s 1S	0	0.	1	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1s 2s	4525270	541.0475	3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 2p	4590000*	569.0728	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 3s	4597259	569.9728	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 3p	5340000*	662.0585	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 3d	4359363	540.4782	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 4s	5365010	665.1593	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 4p	5620000*	696.7732	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 4d	5623000*	697.1452	12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 4f	5624000*	697.2691	20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 4g	5624000*	697.2691	28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
4525270	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4590000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4597259	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5340000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4359363	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5365010	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5620000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5623000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5624000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5624000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
UNSTARRED ENERGY LEVELS FROM MOORE (1949) AND EDLEN (1952)

TABLE 72 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 6+

LEVEL	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	100000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
4525270	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.35E-35
4530000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.41E-36
4597259	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.08E-29
5340000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.40E-35
4359363	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.72E-33
5365010	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.07E-33
5620000	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.99E-33
5623000	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.05E-35
5624000	0.	0.	0.	0.	0.	0.	0.	0.	0.	8.78E-35
5624000	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.44E-34
5624000	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.02E-34

LEVEL	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	0	0
4525270	2.18E-14	2.54E-07	5.81E-05	4.15E-03	3.09E-02	3.18E-02	3.00E-02	2.83E-02	0.	0.
4530000	4.57E-15	6.74E-08	1.64E-05	1.24E-03	9.84E-03	1.04E-02	9.84E-03	9.35E-03	0.	0.
4597259	5.20E-14	7.90E-07	1.95E-04	1.50E-02	1.17E-01	1.24E-01	1.18E-01	1.12E-01	0.	0.
5340000	8.29E-17	1.82E-08	1.10E-05	1.71E-03	2.25E-02	3.16E-02	3.25E-02	3.56E-02	0.	0.
4359363	2.84E-13	1.86E-06	3.46E-04	2.11E-02	1.39E-01	1.35E-01	1.25E-01	1.16E-01	0.	0.
5365010	3.46E-16	8.32E-08	5.17E-05	8.27E-03	1.13E-01	1.57E-01	1.63E-01	1.67E-01	0.	0.
5620000	1.11E-17	6.65E-09	5.61E-06	1.15E-03	1.08E-02	2.66E-02	3.07E-02	3.22E-02	0.	0.
5623000	3.25E-17	1.97E-08	1.67E-05	3.42E-03	5.62E-02	6.57E-02	9.22E-02	9.67E-02	0.	0.
5624000	5.37E-17	3.28E-08	2.78E-05	5.69E-03	9.35E-02	1.43E-01	1.54E-01	1.61E-01	0.	0.
5624000	7.52E-17	4.59E-08	3.80E-05	7.97E-03	1.31E-01	2.00E-01	2.15E-01	2.26E-01	0.	0.

TABLE 73. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar 4+

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)									
			(CM-1)	(EV)	WT.	5200	5600	6000	6400	6800	7200	7600
2s ² 3s ¹	0	1	114744	0.	1	1.70E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2s ² 3p ¹	1	9	114744	14.2261	1	1.47E-13	1.42E-12	1.01E-11	5.64E-11	2.97E-10	9.91E-10	3.31E-09
2s ² 3d ¹	2	3	170120	21.1640	3	9.17E-21	2.64E-19	4.99E-18	6.64E-17	1.04E-16	4.50E-15	2.74E-14
3s ² 3p ¹	3	15	324151	40.1886	15	0.	1.02E-35	2.62E-33	3.37E-31	2.49E-29	1.11E-27	3.39E-26
3s ² 3d ¹	4	5	2660000	32.9789	5	5.43E-32	1.04E-29	9.93E-28	5.35E-26	1.80E-24	4.11E-23	8.74E-22
3s ² 3p ¹	5	15	2710000	33.5989	15	4.09E-32	8.64E-30	8.98E-28	5.21E-26	1.80E-24	4.54E-23	7.95E-22
3s ² 3d ¹	6	45	3100000	18.4361	45	3.34E-34	1.54E-33	5.12E-31	3.25E-29	1.94E-27	7.49E-26	1.95E-24
3s ² 3p ¹	7	3	3500000	41.3934	3	0.	0.	1.60E-35	3.03E-33	3.10E-31	1.90E-29	7.53E-28
3s ² 3d ¹	8	1	513383	63.7365	1	0.	0.	0.	0.	0.	0.	0.
3s ² 3p ¹	9	1	5260000	65.2140	1	0.	0.	0.	0.	0.	0.	0.
3s ² 3d ¹	10	9	5440000	70.1732	9	0.	0.	0.	0.	0.	0.	0.
3s ² 3p ¹	11	3	544362	70.2181	3	0.	0.	0.	0.	0.	0.	0.
3s ² 3d ¹	12	15	636490	78.9127	15	0.	0.	0.	0.	0.	0.	0.
3s ² 3p ¹	13	5	6360000	79.0999	5	0.	0.	0.	0.	0.	0.	0.
3s ² 3d ¹	14	21	640092	81.8389	21	0.	0.	0.	0.	0.	0.	0.
3s ² 3p ¹	15	60	4650000	97.6512	60	0.	0.	0.	0.	0.	0.	0.
3s ² 3d ¹	16	12	6400000	79.3478	12	0.	0.	0.	0.	0.	0.	0.

TEMPERATURE (DEG K)

LEVEL

(CM-1)	8000	9200	9400	10000	11000	12000	13000	14000	15000	16000	17000	18000
114744	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
170120	6.41E-08	1.49E-07	3.04E-07	6.09E-07	2.73E-06	9.34E-06	2.75E-05	6.81E-05	1.49E-04	2.97E-04	5.45E-04	9.99E-04
324151	2.26E-12	7.62E-12	2.32E-11	6.45E-11	6.02E-10	3.87E-09	1.87E-08	7.20E-08	2.32E-07	4.49E-07	1.59E-06	3.55E-06
2660000	6.47E-19	4.29E-18	2.43E-17	1.20E-16	3.80E-15	1.90E-14	3.94E-13	5.11E-12	4.71E-11	3.29E-10	1.82E-09	8.30E-09
2710000	8.50E-19	5.89E-18	3.44E-17	1.75E-16	6.05E-15	1.14E-14	1.41E-13	1.20E-12	7.71E-11	3.91E-10	1.64E-09	5.84E-09
3100000	5.84E-21	5.29E-20	3.99E-19	2.56E-18	1.47E-16	4.32E-15	8.75E-14	8.75E-13	7.32E-12	4.49E-11	2.42E-10	1.04E-09
3500000	8.32E-24	7.61E-23	7.45E-22	6.07E-21	5.91E-19	2.68E-17	6.76E-16	1.08E-14	1.10E-13	9.45E-13	6.14E-12	3.18E-11
513383	9.41E-37	3.64E-35	1.04E-33	1.26E-32	1.88E-29	5.11E-27	5.05E-25	3.41E-23	1.15E-21	2.51E-20	3.15E-19	4.27E-18
5260000	6.47E-38	1.80E-36	5.79E-35	1.34E-33	1.32E-30	4.08E-28	5.21E-26	3.34E-24	1.23E-22	2.87E-21	4.63E-20	5.49E-19
5440000	0.	0.	1.30E-34	3.87E-33	6.34E-32	3.03E-29	5.11E-27	4.92E-25	2.30E-23	7.00E-22	1.61E-20	2.82E-19
544362	0.	0.	4.10E-37	1.22E-35	2.02E-32	9.46E-30	1.89E-27	1.80E-25	7.44E-23	2.20E-22	4.37E-21	8.54E-20
636490	0.	0.	0.	0.	1.05E-35	1.00E-32	3.82E-30	5.84E-28	7.49E-26	2.80E-24	4.04E-23	1.28E-21
6360000	0.	0.	0.	0.	2.87E-34	3.00E-33	1.08E-30	1.04E-28	1.32E-26	1.77E-24	1.77E-23	3.58E-22
640092	0.	0.	0.	0.	6.96E-37	8.92E-34	3.93E-31	7.25E-29	6.68E-27	3.49E-25	1.15E-23	2.98E-22
4650000	5.76E-32	1.57E-30	3.25E-29	5.28E-28	2.31E-25	3.67E-23	2.64E-21	1.04E-19	2.54E-18	4.15E-17	4.04E-16	4.32E-15
6400000	0.	0.	0.	0.	5.29E-36	5.67E-33	2.07E-30	3.27E-28	2.62E-26	1.22E-24	3.59E-23	7.27E-22

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949)

TABLE 73 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 4+

LEVEL	TEMPERATURE (DEG K)										
	10000	20000	24000	28000	32000	36000	40000	44000	48000	52000	100000
1C4-11	0	9.28E-01	7.98E-01	9.91E-01	9.75E-01	9.49E-01	9.13E-01	8.67E-01	8.14E-01	7.57E-01	6.95E-01
114744	1.51E-03	2.33E-03	9.10E-03	2.51E-02	4.91E-02	6.31E-02	1.24E-01	1.72E-01	2.19E-01	2.64E-01	3.07E-01
170720	7.28E-06	1.39E-05	1.07E-04	4.53E-04	1.32E-03	2.98E-03	5.60E-03	9.19E-03	1.34E-02	1.94E-02	2.58E-02
324151	3.27E-10	1.12E-09	1.40E-08	8.54E-07	6.67E-06	3.24E-05	1.12E-04	3.04E-04	6.83E-04	1.57E-03	3.07E-03
268000	1.92E-09	2.44E-08	5.86E-07	5.65E-06	3.04E-05	1.10E-04	3.03E-04	1.30E-03	4.97E-03	1.49E-02	2.34E-02
271000	1.83E-08	5.11E-08	1.31E-06	1.31E-05	7.27E-05	2.71E-04	7.59E-04	1.73E-03	3.37E-03	1.32E-02	4.00E-02
310000	3.82E-09	1.24E-08	5.05E-07	7.07E-06	5.04E-05	2.20E-04	7.47E-04	1.93E-03	2.00E-02	8.10E-02	1.50E-01
350070	1.39E-10	5.21E-10	3.44E-08	6.79E-07	6.28E-06	3.44E-05	1.33E-04	3.92E-04	9.47E-04	5.94E-03	2.96E-02
514083	3.71E-17	2.60E-16	1.24E-14	9.25E-12	2.61E-10	1.27E-08	4.27E-07	1.47E-06	5.41E-05	7.70E-04	3.99E-03
526000	5.02E-18	3.67E-17	2.00E-14	1.74E-12	5.09E-11	6.77E-10	5.24E-09	2.74E-08	1.08E-07	1.95E-06	2.77E-05
544000	2.16E-18	1.84E-17	1.64E-14	2.05E-12	7.58E-11	1.23E-09	1.12E-08	6.71E-08	2.92E-07	4.72E-06	1.22E-05
566362	7.09E-19	6.04E-18	5.34E-15	6.72E-13	2.48E-11	4.05E-10	3.49E-09	2.71E-08	9.43E-08	2.22E-06	1.30E-05
634490	1.75E-20	1.95E-19	3.99E-16	9.14E-14	5.31E-12	1.23E-10	1.40E-09	1.72E-08	5.88E-08	2.04E-06	5.70E-05
638000	5.20E-21	5.82E-20	1.21E-16	2.82E-14	1.65E-12	3.81E-11	4.48E-10	3.54E-09	1.87E-08	6.64E-07	1.85E-05
660072	4.10E-21	4.98E-20	1.36E-16	3.91E-14	2.57E-12	6.69E-11	8.88E-10	7.22E-09	4.04E-08	1.64E-06	5.22E-05
663000	3.05E-14	1.77E-13	4.65E-11	2.44E-09	6.74E-08	4.63E-07	2.83E-06	1.22E-05	4.02E-05	3.09E-04	4.97E-03
640090	1.07E-20	1.21E-19	2.58E-16	6.11E-14	3.43E-12	8.53E-11	1.05E-09	7.96E-09	4.24E-08	1.52E-06	4.20E-05

LEVEL	TEMPERATURE (DEG K)										
	100000	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	20000000	40000000
1C4-11	0	4.32E-02	1.39E-02	9.06E-03	4.31E-03	4.74E-03	3.92E-03	3.17E-03	2.44E-03	1.84E-03	0.
114744	1.70E-01	8.20E-02	4.20E-02	2.20E-02	1.10E-02	5.50E-03	2.70E-03	1.30E-03	6.50E-04	3.20E-04	0.
170720	3.79E-72	2.24E-02	1.11E-02	5.40E-03	2.50E-03	1.20E-03	5.50E-04	2.50E-04	1.10E-04	5.00E-05	0.
324151	6.29E-02	6.50E-02	6.25E-02	5.94E-02	5.49E-02	5.04E-02	4.59E-02	4.14E-02	3.69E-02	3.24E-02	0.
268000	3.11E-02	2.67E-02	2.39E-02	2.15E-02	1.94E-02	1.74E-02	1.54E-02	1.34E-02	1.14E-02	9.4E-03	0.
271000	9.22E-02	7.87E-02	7.10E-02	6.41E-02	5.87E-02	5.40E-02	4.93E-02	4.46E-02	3.99E-02	3.52E-02	0.
310090	2.79E-01	2.74E-01	2.59E-01	2.42E-01	2.25E-01	2.08E-01	1.91E-01	1.74E-01	1.57E-01	1.40E-01	0.
350000	1.57E-01	1.70E-01	1.74E-01	1.72E-01	1.64E-01	1.56E-01	1.47E-01	1.38E-01	1.29E-01	1.20E-01	0.
514083	3.21E-03	6.54E-03	7.93E-03	9.04E-03	9.84E-03	1.03E-02	1.04E-02	1.05E-02	1.06E-02	1.07E-02	0.
526000	9.82E-04	2.10E-03	2.57E-03	2.96E-03	3.26E-03	3.49E-03	3.65E-03	3.79E-03	3.92E-03	4.04E-03	0.
566000	6.43E-03	1.63E-02	2.10E-02	2.52E-02	2.83E-02	3.02E-02	3.18E-02	3.32E-02	3.44E-02	3.55E-02	0.
566362	2.20E-03	5.44E-03	6.99E-03	8.38E-03	9.49E-03	1.01E-02	1.03E-02	1.04E-02	1.05E-02	1.06E-02	0.
634490	6.45E-03	2.11E-02	2.94E-02	3.79E-02	4.51E-02	4.91E-02	5.04E-02	5.13E-02	5.19E-02	5.23E-02	0.
638000	2.12E-03	7.01E-03	9.81E-03	1.24E-02	1.50E-02	1.63E-02	1.68E-02	1.72E-02	1.75E-02	1.77E-02	0.
660092	7.86E-03	2.72E-02	3.91E-02	5.13E-02	6.21E-02	6.81E-02	7.02E-02	7.19E-02	7.32E-02	7.43E-02	0.
663000	9.14E-02	1.57E-01	1.70E-01	1.94E-01	2.04E-01	2.09E-01	2.10E-01	2.11E-01	2.11E-01	2.11E-01	0.
640090	5.19E-03	1.67E-02	2.34E-02	3.02E-02	3.60E-02	3.94E-02	4.03E-02	4.12E-02	4.17E-02	4.21E-02	0.

TABLE 74. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 7+

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)											
				5200	5600	6000	6400	6800	7200	7600	8000	8400	8800	9200	9600
1s	0	0.	2	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2s	5270855	653.4859	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p	5271783	653.6009	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3s	6247421	774.5415	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3p	6247696	774.5956	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3d	6247933	774.6290	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4s	6589164	816.9311	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4p	6589279	816.9454	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	6589379	816.9578	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4f	6589422	816.9631	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)											
	8800	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000	18000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
5270855	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5271783	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247421	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247696	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247933	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589164	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589279	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589379	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589422	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONITORING ENERGY LEVELS FROM GAMMA AND X-RAY (1965)

TABLE T4 (CONT.-1). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF O 7+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	10000	20000	24000	28000	32000	36000	40000	44000	48000	50000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
5270855	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5271783	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247421	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247696	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6247933	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589164	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589279	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589379	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6589422	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
5270855	1.41E-17	5.84E-09	3.24E-06	9.94E-01	7.52E-01	2.47E-01	1.34E-01	7.89E-02	0.	0.
5271783	1.02E-16	1.75E-08	9.70E-06	1.52E-03	5.08E-02	1.11E-01	1.14E-01	1.10E-01	0.	0.
6247421	3.03E-20	1.74E-10	3.12E-07	1.74E-04	8.40E-03	2.61E-02	3.01E-02	3.20E-02	0.	0.
6247696	9.07E-20	5.22E-10	9.34E-07	3.73E-04	2.52E-02	7.83E-02	9.82E-02	9.59E-02	0.	0.
6247933	1.51E-19	8.69E-10	1.56E-06	6.21E-04	4.20E-02	1.31E-01	1.50E-01	1.60E-01	0.	0.
6589164	2.59E-21	5.09E-11	1.37E-07	7.60E-05	6.57E-03	2.31E-02	2.77E-02	3.04E-02	0.	0.
6589279	7.77E-21	1.53E-10	4.12E-07	2.28E-04	1.97E-02	6.93E-02	8.31E-02	9.13E-02	0.	0.
6589379	1.29E-20	2.54E-10	6.84E-07	3.80E-04	3.28E-02	1.15E-01	1.34E-01	1.52E-01	0.	0.
6589422	1.81E-20	3.54E-10	9.61E-07	5.32E-04	4.60E-02	1.62E-01	1.94E-01	2.13E-01	0.	0.

TABLE 75. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF CR 7.

STATE	LEVEL	STAT.	(CM-1)	(EV)	WT.	TEMPERATURE (DEG A)									
						5200	5600	6000	6400	6800	7200	7600	8000	8400	8800
2p 3s	0		141870	0.	2	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	3p		332667	17.5892	6	2.69E-17	4.44E-16	5.04E-15	6.22E-14	2.78E-13	1.44E-12	6.50E-12	2.49E-11	8.39E-11	1.00E-00
	3d		575910	41.2444	10	0.	3.80E-37	1.13E-34	1.44E-32	1.33E-30	6.73E-29	2.23E-27	5.19E-26	8.97E-25	0.
	4s		628905	71.4019	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	4p		716837	77.9723	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	0		697517	86.4789	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	4f		716837	88.8742	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LEVEL															
TEMPERATURE (DEG K)															
(CM-1)	8800		9200		9600	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000
	0		1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
	141870		2.53E-10	6.94E-10	1.75E-09	4.09E-09	2.62E-08	1.23E-07	4.55E-07	1.40E-06	3.69E-06	8.64E-06	1.83E-05	3.37E-05	1.00E-00
	332667		1.20E-23	1.27E-22	1.11E-21	8.17E-21	6.33E-20	2.38E-19	5.12E-18	7.10E-17	6.93E-16	5.09E-15	2.74E-14	1.41E-13	1.00E-00
	575910		0.	0.	0.	0.	1.03E-36	1.03E-35	2.00E-34	1.97E-33	1.97E-32	3.23E-31	6.79E-30	1.02E-29	1.02E-28
628905	0.		0.	0.	0.	0.	5.65E-36	5.36E-35	1.77E-34	2.55E-33	1.90E-32	6.24E-31	2.50E-30	4.42E-29	0.
	0.		0.	0.	0.	0.	0.	2.39E-36	1.49E-35	3.69E-34	4.39E-33	2.87E-32	1.15E-31	3.04E-30	5.13E-29
697517	0.		0.	0.	0.	0.	0.	3.30E-37	2.45E-36	7.09E-35	9.63E-34	7.08E-33	3.14E-32	5.13E-31	0.
716837	0.		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TABLE 75 (CONT.-). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 7+

LEVEL	19000	20000	24000	28000	32000	36000	40000	44000	48000	60000	80000	100000
(CM-1)	TEMPERATURE (DEG K)											
0	1.00E-00	1.00E-00	9.99E-01	9.78E-01	9.95E-01	9.90E-01	9.82E-01	9.72E-01	9.59E-01	9.08E-01	8.02E-01	6.98E-01
141070	6.48E-05	1.11E-04	6.07E-04	2.04E-03	5.07E-03	1.02E-02	1.79E-02	2.82E-02	4.09E-02	9.07E-02	1.88E-01	2.72E-01
332667	5.73E-11	2.02E-10	1.09E-09	1.88E-07	1.59E-06	8.32E-06	3.12E-05	9.17E-05	2.24E-04	1.58E-03	1.01E-02	2.91E-02
575910	1.15E-19	1.02E-18	1.01E-15	1.40E-13	5.65E-12	9.99E-11	9.90E-10	6.44E-09	3.05E-08	9.13E-07	2.55E-05	1.76E-04
628905	6.22E-21	6.73E-20	1.27E-16	2.76E-14	1.56E-12	3.60E-11	4.41E-10	3.41E-09	1.87E-08	7.68E-07	2.95E-05	2.46E-04
697517	5.75E-23	8.04E-22	3.45E-18	1.36E-15	1.19E-13	3.07E-12	6.24E-11	4.04E-10	3.99E-09	2.47E-07	1.43E-05	1.53E-04
716037	1.04E-23	2.61E-22	1.52E-18	7.03E-16	7.00E-14	2.50E-12	4.36E-11	4.49E-10	3.13E-09	2.18E-07	1.41E-05	1.62E-04
LEVEL	TEMPERATURE (DEG K)											
(CM-1)	TEMPERATURE (DEG K)											
0	3.76E-01	1.74E-01	1.18E-01	7.39E-02	5.74E-02	4.81E-02	4.53E-02	4.31E-02	0.	0.	0.	0.
141070	4.04E-01	3.17E-01	2.31E-01	1.45E-01	1.56E-01	1.37E-01	1.31E-01	1.27E-01	0.	0.	0.	0.
332667	1.77E-01	2.65E-01	2.47E-01	2.26E-01	2.13E-01	2.13E-01	2.09E-01	2.09E-01	0.	0.	0.	0.
575910	5.97E-03	2.21E-02	2.96E-02	3.49E-02	3.79E-02	3.91E-02	3.94E-02	3.97E-02	0.	0.	0.	0.
628905	1.22E-02	5.49E-02	7.82E-02	9.69E-02	1.10E-01	1.15E-01	1.17E-01	1.18E-01	0.	0.	0.	0.
697517	1.24E-02	7.13E-02	1.11E-01	1.46E-01	1.74E-01	1.87E-01	1.91E-01	1.95E-01	0.	0.	0.	0.
716037	1.52E-02	9.34E-02	1.48E-01	1.99E-01	2.40E-01	2.60E-01	2.67E-01	2.72E-01	0.	0.	0.	0.

TABLE 7A. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 0+

STATE	LEVEL (CM-1)	STAT. WT.	LEVEL (EV)	TEMPERATURE (DEG K.)										
				5200	5600	6000	6400	6800	7200	7600	8000	8400		
2s ² 2p ⁶	0	1	0.	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00		
2s ² 2p ⁵ 3s	20390000	12	252.7973	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 3p	22200000	36	275.2378	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 3d	23800000	60	295.0748	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 4s	27100000	12	335.9885	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 4p	27900000	36	345.9075	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 4d	28400000	60	352.1060	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 5s	28600000	84	354.5857	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 5p	26000000	4	322.3506	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 5d	27800000	12	344.6672	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 6s	28400000	20	364.5041	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 6p	32700000	4	405.4179	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 6d	33500000	12	415.3363	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 7s	34000000	20	421.5354	0.	0.	0.	0.	0.	0.	0.	0.	0.		
2s ² 2p ⁵ 7d	34700000	28	424.0150	0.	0.	0.	0.	0.	0.	0.	0.	0.		

STATE	LEVEL (CM-1)	STAT. WT.	LEVEL (EV)	TEMPERATURE (DEG K.)										
				8800	9200	9600	10000	11000	12000	13000	14000	15000	16000	17000
2s ² 2p ⁵ 8s	0	1	0.	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2s ² 2p ⁵ 8p	20390000	12	252.7973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 8d	22200000	36	275.2378	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 9s	23800000	60	295.0748	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 9p	27100000	12	335.9885	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 9d	27900000	36	345.9075	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 10s	28400000	60	352.1060	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 10p	28600000	84	354.5857	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 11s	26000000	4	322.3506	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 11d	27800000	12	344.6672	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 12s	28400000	20	364.5041	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 12p	32700000	4	405.4179	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 12d	33500000	12	415.3363	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 13s	34000000	20	421.5354	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2s ² 2p ⁵ 13d	34700000	28	424.0150	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM MOORE (1949)

TABLE 76 (CONT.). ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF Ar 8+

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	19000	20000	24000	28000	32000	36000	40000	44000	48000	100000
0	1.00E-00	1.00E-00	1.00E-00	1.30E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2039000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2220000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2280000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2710000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2790000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2840000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2860000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2880000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2940000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3270000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3350000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3400000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3420000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	TEMPERATURE (DEG K)									
	200000	400000	600000	1000000	2000000	4000000	6000000	10000000	0	0
0	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	0.	0.
2039000	5.11E-04	5.11E-04	5.11E-04	5.11E-04	5.11E-04	5.11E-04	5.11E-04	5.11E-04	0.	0.
2220000	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	0.	0.
2280000	2.20E-04	2.20E-04	2.20E-04	2.20E-04	2.20E-04	2.20E-04	2.20E-04	2.20E-04	0.	0.
2710000	4.10E-08	4.10E-08	4.10E-08	4.10E-08	4.10E-08	4.10E-08	4.10E-08	4.10E-08	0.	0.
2790000	6.91E-08	6.91E-08	6.91E-08	6.91E-08	6.91E-08	6.91E-08	6.91E-08	6.91E-08	0.	0.
2840000	8.04E-08	8.04E-08	8.04E-08	8.04E-08	8.04E-08	8.04E-08	8.04E-08	8.04E-08	0.	0.
2860000	9.75E-08	9.75E-08	9.75E-08	9.75E-08	9.75E-08	9.75E-08	9.75E-08	9.75E-08	0.	0.
2880000	3.01E-08	3.01E-08	3.01E-08	3.01E-08	3.01E-08	3.01E-08	3.01E-08	3.01E-08	0.	0.
2940000	2.48E-08	2.48E-08	2.48E-08	2.48E-08	2.48E-08	2.48E-08	2.48E-08	2.48E-08	0.	0.
3270000	1.30E-08	1.30E-08	1.30E-08	1.30E-08	1.30E-08	1.30E-08	1.30E-08	1.30E-08	0.	0.
3350000	4.10E-10	4.10E-10	4.10E-10	4.10E-10	4.10E-10	4.10E-10	4.10E-10	4.10E-10	0.	0.
3400000	4.77E-10	4.77E-10	4.77E-10	4.77E-10	4.77E-10	4.77E-10	4.77E-10	4.77E-10	0.	0.
3420000	5.78E-10	5.78E-10	5.78E-10	5.78E-10	5.78E-10	5.78E-10	5.78E-10	5.78E-10	0.	0.

TABLE 77. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 9+

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				22000	24000	30000	34000	38000	42000	46000	50000	56000	76000
2s 2p ⁵	0	0.	4	8.67E-01	8.43E-01	8.26E-01	8.11E-01	7.96E-01	7.88E-01	7.79E-01	7.71E-01	7.63E-01	7.43E-01
2s 2p ⁵	18053	2.2382	2	1.33E-01	1.35E-01	1.37E-01	1.39E-01	1.41E-01	1.42E-01	1.43E-01	1.44E-01	1.45E-01	1.46E-01
2s 2p ⁵	604300	74.9217	2	2.97E-18	1.27E-15	1.07E-13	3.18E-12	4.62E-11	4.83E-10	2.41E-09	1.06E-08	1.58E-06	1.58E-06
2s 2p ⁵	2260000	280.1971	18	0.	0.	0.	0.	2.47E-37	0.44E-34	7.00E-31	1.90E-28	2.24E-26	2.24E-26
2s 2p ⁵	2440000	302.5136	54	0.	0.	0.	0.	0.	5.31E-34	7.53E-33	3.34E-30	1.60E-21	1.60E-21
2p 2p ⁴	2800000	322.3506	90	0.	0.	0.	0.	0.	0.	8.42E-35	5.50E-32	1.03E-22	1.03E-22
2p 2p ⁴	3000000	371.9430	288	0.	0.	0.	0.	0.	0.	0.	1.79E-36	8.09E-26	8.09E-26
2p 2p ⁴	2330000	288.8757	10	0.	0.	0.	0.	0.	0.	4.35E-32	1.07E-29	2.99E-21	2.99E-21
2p 2p ⁴	2510000	311.1923	30	0.	0.	0.	0.	0.	0.	2.60E-37	2.40E-34	2.19E-22	2.19E-22
2p 2p ⁴	2670000	331.0293	50	0.	0.	0.	0.	0.	0.	5.24E-34	4.13E-33	1.34E-23	1.34E-23
2p 2p ⁴	3100000	394.3411	160	0.	0.	0.	0.	0.	0.	0.	0.	6.32E-27	6.32E-27
2p 2p ⁴	2500000	309.9525	2	0.	0.	0.	0.	0.	0.	2.52E-34	2.20E-32	1.79E-23	1.79E-23
2p 2p ⁴	2700000	334.7487	60	0.	0.	0.	0.	0.	0.	2.44E-34	2.09E-33	2.02E-24	2.02E-24
2p 2p ⁴	2750000	340.9476	10	0.	0.	0.	0.	0.	0.	8.58E-38	8.27E-35	7.26E-25	7.26E-25
2p 2p ⁴	3200000	396.7592	18	0.	0.	0.	0.	0.	0.	0.	0.	9.11E-29	9.11E-29
2p 2p ⁴	3400000	371.9430	216	0.	0.	0.	0.	0.	0.	0.	1.34E-36	6.67E-26	6.67E-26
2p 2p ⁴	3400000	421.5354	384	0.	0.	0.	0.	0.	0.	0.	0.	3.19E-29	3.19E-29

LEVEL (CM-1)	90000	150000	300000	500000	800000	1500000	3000000	5000000	8000000	0	0	0	0
0	7.27E-01	7.03E-01	6.73E-01	6.06E-01	2.92E-01	4.60E-02	1.19E-02	6.74E-03	4.90E-03	0.	0.	0.	0.
18053	2.73E-01	2.96E-01	3.08E-01	2.88E-01	1.42E-01	2.24E-02	5.89E-03	3.34E-03	2.44E-03	0.	0.	0.	0.
604300	2.32E-05	1.07E-03	1.85E-02	5.23E-02	4.93E-02	1.29E-02	4.44E-03	2.84E-03	2.20E-03	0.	0.	0.	0.
2260000	6.67E-16	1.22E-09	5.94E-05	4.09E-03	2.26E-02	2.37E-02	1.81E-02	1.59E-02	1.47E-02	0.	0.	0.	0.
2440000	1.13E-16	6.50E-10	7.52E-05	7.31E-03	4.90E-02	5.90E-02	4.97E-02	4.52E-02	4.27E-02	0.	0.	0.	0.
2600000	1.45E-17	2.34E-10	5.81E-05	7.68E-03	6.13E-02	8.55E-02	7.68E-02	6.91E-02	6.91E-02	0.	0.	0.	0.
3000000	7.77E-20	1.61E-11	2.73E-05	7.78E-03	9.55E-02	1.84E-01	2.03E-01	2.04E-01	2.04E-01	0.	0.	0.	0.
2330000	1.21E-16	3.46E-10	2.38E-05	1.86E-03	1.11E-02	1.23E-02	9.71E-03	8.64E-03	8.04E-03	0.	0.	0.	0.
2510000	2.04E-17	1.85E-10	2.98E-05	3.32E-03	2.40E-02	3.11E-02	2.67E-02	2.46E-02	2.34E-02	0.	0.	0.	0.
2670000	2.64E-18	6.63E-11	2.31E-05	3.49E-03	3.00E-02	4.44E-02	4.12E-02	3.92E-02	3.79E-02	0.	0.	0.	0.
3100000	8.73E-21	3.43E-12	9.40E-06	3.24E-03	4.43E-02	9.41E-02	1.07E-01	1.11E-01	1.12E-01	0.	0.	0.	0.
2500000	1.60E-18	1.35E-11	2.09E-06	2.28E-04	1.63E-03	2.09E-03	1.79E-03	1.65E-03	1.54E-03	0.	0.	0.	0.
2700000	1.96E-18	5.97E-11	2.40E-05	3.64E-03	3.41E-02	5.18E-02	4.88E-02	4.64E-02	4.53E-02	0.	0.	0.	0.
2750000	1.47E-19	6.16E-12	3.15E-06	5.54E-04	4.20E-03	4.23E-03	7.94E-03	7.46E-03	7.46E-03	0.	0.	0.	0.
3200000	1.99E-22	1.48E-13	6.54E-07	2.73E-04	4.17E-03	9.62E-03	1.15E-02	1.21E-02	1.24E-02	0.	0.	0.	0.
3000000	5.83E-20	1.21E-11	2.05E-05	5.83E-03	7.18E-02	1.40E-01	1.52E-01	1.54E-01	1.54E-01	0.	0.	0.	0.
3400000	1.73E-22	4.63E-13	5.35E-06	3.28E-03	6.20E-02	1.69E-01	2.23E-01	2.44E-01	2.55E-01	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
 *NONSTARRED ENERGY LEVELS FROM PRYCE (1964).

TABLE 78. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 10*

STATE	LEVEL	STAT.	TEMPERATURE (DEG K)									
	(CM-1)	(EV)	WT.	22000	28000	30000	34000	38000	42000	44000	50000	70000
2s ² 2p ⁴ ³ P ₂	0	0.	5	7.66E-01	7.33E-01	7.05E-01	6.80E-01	6.58E-01	6.39E-01	6.21E-01	6.04E-01	5.86E-01
	14457	1.7924	3	1.79E-01	1.98E-01	2.11E-01	2.21E-01	2.28E-01	2.34E-01	2.37E-01	2.40E-01	2.44E-01
	18000	2.2317	1	4.72E-02	5.91E-02	5.93E-02	6.35E-02	6.66E-02	6.89E-02	7.09E-02	7.22E-02	7.35E-02
	70000	8.6787	5	7.67E-03	1.52E-02	2.45E-02	3.52E-02	4.55E-02	5.81E-02	6.96E-02	8.08E-02	1.30E-01
	150000	18.5972	1	8.41E-06	3.64E-05	1.06E-04	2.38E-04	4.50E-04	7.49E-04	1.14E-03	1.62E-03	5.01E-03
2s 2p ⁵ ¹ P ₁	531000	65.8339	9	1.14E-15	2.28E-13	1.10E-11	2.13E-10	2.20E-09	1.45E-08	4.85E-08	2.52E-07	1.79E-05
	700000	86.7867	3	6.03E-21	6.81E-18	1.11E-15	5.57E-14	1.22E-12	1.40E-11	1.16E-10	6.49E-10	1.85E-07
LEVEL												
TEMPERATURE (DEG K)												
(CM-1)	90000	150000	300000	500000	800000	1500000	3000000	5000000	8000000	0	0	0
0	5.07E-01	4.47E-01	3.69E-01	3.14E-01	2.72E-01	2.33E-01	2.10E-01	2.00E-01	1.94E-01	0.	0.	0.
14457	2.42E-01	2.31E-01	2.06E-01	1.81E-01	1.59E-01	1.38E-01	1.25E-01	1.19E-01	1.16E-01	0.	0.	0.
18000	7.61E-02	7.44E-02	6.75E-02	5.97E-02	5.27E-02	4.59E-02	4.16E-02	3.98E-02	3.87E-02	0.	0.	0.
70000	1.66E-01	2.26E-01	2.63E-01	2.57E-01	2.40E-01	2.18E-01	2.03E-01	1.94E-01	1.92E-01	0.	0.	0.
150000	9.22E-03	2.10E-02	3.58E-02	4.08E-02	4.15E-02	4.04E-02	3.90E-02	3.83E-02	3.78E-02	0.	0.	0.
531000	1.88E-04	4.89E-03	5.19E-02	1.23E-01	1.88E-01	2.52E-01	2.92E-01	3.09E-01	3.18E-01	0.	0.	0.
700000	4.20E-06	3.22E-04	7.69E-03	2.51E-02	4.64E-02	7.16E-02	8.99E-02	9.80E-02	1.03E-01	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM PRYCE (1964).

TABLE 79. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR II*

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				22000	26000	30000	34000	38000	42000	46000	50000	54000	70000
2s ² 2p ⁵	0	0.	4	9.91E-01	9.91	01	9.85E-01	9.73E-01	9.54E-01	9.13E-01	8.80E-01	7.54E-01	
	107000*	13.2660	10	2.21E-03	6.66	3	1.45E-02	2.43E-02	1.4E-02	5.94E-02	8.83E-02	1.02E-01	2.10E-01
	170000*	21.0768	6	2.22E-05	1.22E	1	4.25E-04	1.10E-03	2.50E-03	4.15E-03	6.72E-03	1.00E-02	3.44E-02
LEVEL				TEMPERATURE (DEG K)									
0	90000	150000	300000	700000	8000	1500000	3000000	5000000	8000000	0	0	0	0
	6.45E-01	4.57E-01	3.16E-01	2.11E-01	2.43E-01	2.21E-01	2.10E-01	2.04E-01	2.04E-01	0.	0.	0.	0.
	107000	2.91E-01	4.09E-01	4.74E-01	4.95E-01	4.98E-01	4.99E-01	5.00E-01	5.00E-01	0.	0.	0.	0.
	170000	6.37E-02	1.34E-01	2.45E-01	2.65E-01	2.81E-01	2.91E-01	2.94E-01	2.94E-01	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MINUS STATED ENERGY LEVELS FROM

TABLE 80. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 12+

STATE	LEVEL	STAT.	WT.	TEMPERATURE (DEG K)									
				(CM-1)	(EV)	22000	26000	30000	34070	38000	42000	46000	50000
2s 2p 3p	0		1	2.60E-01	2.30E-01	2.09E-01	1.93E-01	1.80E-01	1.70E-01	1.61E-01	1.54E-01	1.30E-01	
	10000*	1.2398	3	4.05E-01	3.97E-01	3.88E-01	3.78E-01	3.70E-01	3.61E-01	3.54E-01	3.46E-01	3.17E-01	
	21000*	2.6036	5	3.29E-01	3.60E-01	3.81E-01	3.96E-01	4.06E-01	4.13E-01	4.18E-01	4.21E-01	4.22E-01	
	80000*	9.9185	5	6.93E-03	1.37E-02	2.25E-02	3.26E-02	4.35E-02	5.48E-02	6.69E-02	7.70E-02	1.25E-01	
	153000*	18.9691	1	1.17E-05	4.84E-05	1.36E-04	2.97E-04	5.49E-04	8.98E-04	1.35E-03	1.89E-03	5.40E-03	
LEVEL	TEMPERATURE (DEG K)												
(CM-1)	90000	150000	300000	500000	800000	1500000	3000000	5000000	8000000	0	0	0	
0	1.14E-01	9.65E-02	8.15E-02	7.55E-02	7.22E-02	6.94E-02	6.81E-02	6.74E-02	6.72E-02	0.	0.	0.	
10000	2.97E-01	2.63E-01	2.33E-01	2.20E-01	2.13E-01	2.07E-01	2.03E-01	2.02E-01	2.01E-01	0.	0.	0.	
21000	4.15E-01	3.94E-01	3.69E-01	3.56E-01	3.48E-01	3.41E-01	3.37E-01	3.35E-01	3.33E-01	0.	0.	0.	
80000	1.62E-01	2.74E-01	2.78E-01	3.00E-01	3.13E-01	3.22E-01	3.26E-01	3.30E-01	3.31E-01	0.	0.	0.	
153000	1.01E-02	2.22E-02	3.91E-02	4.84E-02	5.48E-02	6.01E-02	6.33E-02	6.54E-02	6.54E-02	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM

TABLE 81. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 13+

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				22000	26000	30000	34000	38000	42000	46000	50000	70000	
1s	0	0.	2	6.88E-01	6.37E-01	5.97E-01	5.64E-01	5.41E-01	5.20E-01	5.07E-01	4.89E-01	4.74E-01	
2s	22443	2.8098	4	3.12E-01	3.63E-01	4.03E-01	4.34E-01	4.59E-01	4.79E-01	4.92E-01	5.09E-01	5.24E-01	
2p	239000	29.6315	12	6.72E-07	6.89E-06	3.77E-05	1.30E-04	3.81E-04	8.48E-04	1.71E-03	3.82E-03	1.92E-02	
3s	407000	50.4403	10	7.47E-12	5.27E-10	7.99E-09	9.37E-08	5.49E-07	2.49E-06	7.43E-06	2.00E-05	5.86E-05	
3p	510000	63.2303	2	2.25E-15	3.52E-13	1.42E-11	2.40E-10	2.22E-09	1.34E-08	5.94E-08	2.07E-07	1.22E-05	
3d	540000	66.9497	6	9.48E-16	2.01E-13	1.01E-11	2.02E-10	2.14E-09	1.44E-08	6.97E-08	2.61E-07	1.97E-05	
3f	709000	87.9025	4	1.00E-20	1.16E-17	2.04E-15	1.06E-13	2.37E-12	2.95E-11	3.72E-10	4.00E-07	4.00E-07	
4s	805000	99.8047	10	4.70E-23	1.43E-19	5.11E-17	4.54E-15	1.57E-13	2.75E-12	4.72E-11	2.11E-10	1.42E-07	
4p	897000	111.2110	6	6.88E-26	5.29E-22	3.71E-19	5.54E-17	2.89E-15	7.05E-14	1.72E-13	9.03E-12	1.28E-09	
LEVEL				TEMPERATURE (DEG K)									
(CM-1)	40000	150000	300000	500000	800000	1500000	3000000	5000000	8000000	0	0	0	
0	3.95E-01	2.99E-01	1.68E-01	1.04E-01	7.44E-02	5.52E-02	4.11E-02	3.19E-02	2.49E-02	0.	0.	0.	
22443	5.94E-01	4.81E-01	3.02E-01	2.02E-01	1.47E-01	1.08E-01	8.15E-02	6.15E-02	4.75E-02	0.	0.	0.	
239000	5.19E-02	1.81E-01	3.21E-01	3.25E-01	2.98E-01	2.64E-01	2.40E-01	2.30E-01	2.24E-01	0.	0.	0.	
407000	2.95E-03	3.01E-02	1.20E-01	1.47E-01	1.84E-01	1.87E-01	1.84E-01	1.82E-01	1.81E-01	0.	0.	0.	
510000	1.14E-04	2.24E-03	1.44E-02	2.48E-02	3.05E-02	3.79E-02	3.51E-02	3.54E-02	3.54E-02	0.	0.	0.	
540000	2.11E-04	5.09E-03	3.79E-02	6.83E-02	8.67E-02	9.87E-02	1.04E-01	1.02E-01	1.02E-01	0.	0.	0.	
709000	9.44E-06	6.69E-04	1.12E-02	2.80E-02	4.27E-02	5.60E-02	6.30E-02	6.69E-02	6.69E-02	0.	0.	0.	
805000	5.09E-06	6.62E-04	1.77E-02	5.31E-02	9.98E-02	1.28E-01	1.52E-01	1.52E-01	1.52E-01	0.	0.	0.	
897000	7.01E-07	1.64E-04	6.84E-03	2.45E-02	4.54E-02	7.01E-02	8.74E-02	9.51E-02	9.51E-02	0.	0.	0.	

*ESTIMATED **INCLUDES ESTIMATED SUMLEVELS
NONSTARRED ENERGY LEVELS FROM PRYCE (1964)

TABLE 82 ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 14+

STATE	LEVEL		STAT.	TEMPERATURE (DEG K)									
	(CM-1)	(EV)		WT.	22000	26000	30000	34000	38000	42000	46000	50000	70000
2s ¹ S	0	0.	1		1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00	1.00E-00
2p ² P	234000*	29.2595	9		1.78E-06	1.92E-05	1.00E-04	4.14E-04	1.10E-03	2.77E-03	5.37E-03	1.00E-02	6.34E-02
2p ² P	450000*	59.7915	3		4.97E-13	4.59E-11	1.27E-09	1.61E-08	1.19E-07	6.04E-07	2.30E-06	7.04E-06	2.49E-04
2p ² P	620000*	76.8482	9		2.21E-17	1.13E-14	1.10E-12	3.63E-11	5.74E-10	5.34E-09	3.39E-08	1.59E-07	2.44E-05
2p ² D	670000*	83.0673	5		4.67E-19	3.95E-16	5.54E-14	2.43E-12	4.80E-11	5.37E-10	3.94E-09	2.10E-08	4.80E-06
3s ¹ S	876000*	102.9042	1		7.47E-24	1.13E-20	5.15E-18	5.57E-16	2.25E-14	4.47E-13	5.20E-12	4.20E-11	3.44E-08

LEVEL: TEMPERATURE (DEG K)

LEVEL:	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)	TEMPERATURE (DEG K)
(CM-1)	90000	150000	300000	500000	800000	1500000	3000000	5000000	8000000	15000000	30000000	50000000	70000000
0	8.27E-01	4.98E-01	2.03E-01	1.15E-01	7.75E-02	5.50E-02	4.44E-02	4.08E-02	3.89E-02	3.80E-02	3.72E-02	3.64E-02	3.56E-02
234000	1.71E-01	4.86E-01	5.89E-01	5.24E-01	4.54E-01	3.95E-01	3.38E-01	3.43E-01	3.35E-01	3.27E-01	3.19E-01	3.11E-01	3.03E-01
450000	1.86E-03	1.99E-02	7.03E-02	9.43E-02	1.04E-01	1.07E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01	1.08E-01
620000	3.69E-04	1.17E-02	9.34E-02	2.73E-01	2.73E-01	2.73E-01	2.73E-01	2.73E-01	2.73E-01	2.73E-01	2.73E-01	2.73E-01	2.73E-01
670000	4.22E-05	4.03E-03	4.08E-02	8.34E-02	1.18E-01	1.45E-01	1.62E-01	1.68E-01	1.72E-01	1.72E-01	1.72E-01	1.72E-01	1.72E-01
876000	1.43E-06	1.74E-04	3.79E-03	1.05E-02	1.74E-02	2.48E-02	2.99E-02	3.22E-02	3.39E-02	3.56E-02	3.72E-02	3.89E-02	4.05E-02

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
NONSTARRED ENERGY LEVELS FROM

TABLE 84. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 16+

STATE	LEVEL		STAT.	TEMPERATURE (DEG K)											
	(CM-1)	(EV)		WT.	27000	28000	30000	34000	38000	42000	46000	50000	54000	58000	70000
1s ⁰	0	0.	1	1	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1s 2s	24300000*	3012.7383	16	16	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 2p	24800000*	3570.6528	36	36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1s 3s	30400000*	3769.0224	64	64	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL		TEMPERATURE (DEG K)											
(CM-1)		90000	150000	300000	500000	800000	1500000	3000000	5000000	8000000	0	0	0
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
24300000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
28800000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30400000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MONOSTARRED ENERGY LEVELS FROM

TABLE 85. ENERGY LEVELS AND FRACTIONAL ELECTRONIC POPULATIONS OF AR 17*

STATE	LEVEL (CM-1)	LEVEL (EV)	STAT. WT.	TEMPERATURE (DEG K)									
				22000	26000	30000	34000	38000	42000	46000	50000	54000	58000
1s	0	0.	2	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
2s	26764214	3118.2540	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2p	26788837	3221.3068	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3s	31732440	3934.2444	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3p	31739934	3935.1488	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3d	31744034	3935.9051	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4s	33470098	4149.6562	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4p	33473174	4150.0376	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4d	33475746	4150.3564	10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4f	33476844	4150.4926	14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

LEVEL (CM-1)	150000	300000	500000	800000	1500000	3000000	5000000	8000000	15000000	30000000	50000000	80000000	150000000
0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
26764214	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
26788837	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31732440	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31739934	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31744034	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33470098	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33473174	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33475746	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33476844	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

*ESTIMATED **INCLUDES ESTIMATED SUBLEVELS
MINI-STARRED ENERGY LEVELS FROM GARCIA AND MACK (1965)

TABLE 86. DIATOMIC SPECTROSCOPIC CONSTANTS (UNITS: CM-1)

MOL. STATE	T_0	ω_e	$\omega_e x_e$	$\omega_e y_e$	ω_e^2	B_e	α_e	γ_e	δ_e
N_2									
$X^1\Sigma_g^+$	0.	2358.070	14.1880	-1.240E-02	-0.	1.99870	0.0178000	-0.	-0.
$A^3\Sigma_u^+$	49756.6	1460.600	13.8500	6.500E-03	1.800E-03	1.45450	0.0179400	-9.200E-05	-0.
$B^3\Delta_u$	58000.0	1490.900	13.0000	-0.	-0.	1.46000	0.0170090	-0.	-0.
$B^3\Pi_g$	59313.4	1723.880	14.3500	-1.100E-02	2.000E-04	1.63750	0.0179400	-7.400E-05	-0.
$B^3\Sigma_u^-$	65852.3	1516.883	12.1810	4.186E-02	7.323E-04	1.47359	0.0168610	3.619E-05	9.460E-07
$a^1\Sigma_u^-$	67739.3	1530.254	12.0747	4.129E-02	2.896E-04	1.47984	0.0165740	2.410E-05	-0.
$a^1\Pi_g$	68951.2	1696.200	13.9491	7.935E-03	-2.911E-04	1.61688	0.0179330	-2.930E-05	-0.
$w^1\Delta_u$	71698.3	1558.580	11.5300	-4.000E-02	-4.800E-03	1.49830	0.0166500	-0.	-0.
N_2^+									
$X^2\Sigma_g^+$	0.	2207.170	16.1460	-2.850E-02	9.200E-04	1.92580	0.0174300	-1.640E-04	-0.
$A^3\Pi_u$	8068.0	1903.420	15.0000	-0.	-0.	1.74800	0.0200000	-0.	-0.
$B^3\Sigma_u^-$	25586.0	2418.700	22.5300	-6.700E-01	4.000E-02	2.08300	0.0183000	-1.650E-03	-0.
$4\Sigma_u^+$	44328.0	1700.000	16.0000	-0.	-0.	1.60000	0.0200000	-0.	-0.
$4\Delta_u$	51328.0	1600.000	14.0000	-0.	-0.	1.80000	0.0200000	-0.	-0.
$D^3\Pi_g$	51203.0	914.780	13.1200	8.300E-02	-0.	1.11300	0.0200000	-0.	-0.
$4\Sigma_u^-$	60328.0	1500.000	14.0000	-0.	-0.	1.40000	0.0150000	-0.	-0.
$C^3\Sigma_u^+$	64542.0	2073.700	10.9700	-2.400E-01	-0.	1.51240	0.0017000	-7.500E-04	-0.

TABLE 86 (CONT.). DIATOMIC SPECTROSCOPIC CONSTANTS

MOLEC.	STATE	T_0	ω_0	ω_{x_0}	ω_{y_0}	ω_{z_0}	B_0	α_0	γ_0	δ_0
NO	X $^2\Pi$	62.2	1903.980	14.0150	1.000E-02	-5.800E-04	1.70420	0.0172500	-4.000E-05	-0.
	a $^4\Pi$	37965.0	1017.060	11.0000	-0.	-0.	1.17000	0.0170000	-0.	-0.
	A $^2\Sigma^+$	44199.2	2374.860	16.4600	-0.	-0.	1.99720	0.0192800	-0.	-0.
	B $^3\Pi$	45505.0	1037.640	7.5450	8.330E-02	-0.	1.12450	0.0132000	-0.	-0.
	b $^4\Sigma^-$	47092.0	1203.000	14.5000	-0.	-0.	1.36000	0.0240000	-0.	-0.
	C $^3\Pi$	52380.0	2395.000	15.0000	-0.	-0.	2.00200	0.0300000	-0.	-0.
	D $^2\Sigma^+$	53291.2	2323.900	22.8850	7.500E-01	2.200E-01	2.00260	0.0217500	-0.	-0.
HO ⁺	X $^1\Sigma^+$	0.	2377.100	16.3500	1.000E-02	-0.	2.00200	0.0202000	-0.	-0.
	a $^2\Sigma^+$	39934.0	1600.000	14.0000	-0.	-0.	1.65000	0.0200000	-0.	-0.
	B $^3\Sigma$	56804.0	2000.000	14.0000	-0.	-0.	1.50000	0.0200000	-0.	-0.
	B $^3\Pi$	63764.0	1700.000	14.0000	-0.	-0.	1.84000	0.0200000	-0.	-0.
	A $^1\Pi$	73084.0	1608.900	23.3000	-0.	-0.	1.58700	0.0240000	-0.	-0.
	B $^3\Sigma^-$	73334.0	1200.000	12.0000	-0.	-0.	1.22000	0.0150000	-0.	-0.

TABLE 87. IDEAL GAS FUNCTIONS FOR N₂ (MOLECULAR WEIGHT 28.0134, R = 1.98717 CAL/MOLE, 8 STATES INCLUDED)

TEMP. (°K)	PARTIT. FUNCT.	$\frac{H^0-E^0}{RT}$	$\frac{F^0-E^0}{RT}$	ΔS^0	$\ln \frac{H^0-E^0}{RT} - \frac{F^0-E^0}{RT}$	$\ln \frac{H^0-E^0}{RT} - \frac{F^0-E^0}{RT} - \frac{S^0}{R}$	F^0-E^0 -- CAL/MOLE --	H^0-E^0 -- CAL/MOLE --	$-(F^0-E^0)$	TEMP. (°K)
1000	1-8159E 02	3.62519	23.8052	27.4294	7.20187	47.3049	54.5068	7.2019E 03	4.7305E 04	1000
1200	2-2413E 02	3.68633	24.4715	28.1578	7.32534	48.6289	55.9543	7.3254E 03	5.8355E 04	1200
1400	2-7033E 02	3.74630	25.0443	28.7906	7.44452	49.7672	57.2117	7.4445E 03	6.9674E 04	1400
1600	3-2046E 02	3.80178	25.5482	29.3500	7.55476	50.7485	58.3233	7.5548E 03	8.1238E 04	1600
1800	3-7467E 02	3.85210	25.9990	29.8511	7.65477	51.6442	59.3190	7.6547E 04	9.2996E 04	1800
2000	4-3307E 02	3.89741	26.4072	30.3046	7.74480	52.4795	60.2203	7.7448E 04	1.0496E 05	2000
2200	4-9572E 02	3.93781	26.7806	30.7187	7.82568	53.2015	61.0632	7.8257E 04	1.1708E 05	2200
2400	5-6270E 02	3.97474	27.1249	31.0986	7.89846	53.9011	61.8001	7.8985E 04	1.2936E 05	2400
2600	6-3404E 02	4.00778	27.4444	31.4521	7.96411	54.5348	62.5006	7.9641E 04	1.4179E 05	2600
2800	7-0979E 02	4.03768	27.7425	31.7802	8.02354	55.1289	63.1524	8.0235E 04	1.5436E 05	2800
3000	7-8997E 02	4.06488	28.0220	32.0869	8.07758	55.6843	63.7619	8.0776E 04	1.6705E 05	3000
3200	8-7463E 02	4.08971	28.2851	32.3748	8.12692	56.2072	64.3342	8.1269E 04	1.7984E 05	3200
3400	9-6378E 02	4.11247	28.5338	32.6462	8.17215	56.7013	64.8735	8.1721E 04	1.9278E 05	3400
3600	1-0575E 03	4.13342	28.7694	32.9028	8.21379	57.1696	65.3834	8.2138E 04	2.0581E 05	3600
3800	1-1957E 03	4.15278	28.9934	33.1462	8.25227	57.6147	65.8670	8.2523E 04	2.1894E 05	3800
4000	1-2585E 03	4.17075	29.2069	33.3776	8.28794	58.0389	66.3269	8.2879E 04	2.3216E 05	4000
4200	1-3660E 03	4.18747	29.4108	33.5983	8.32119	58.4441	66.7653	8.3212E 04	2.4547E 05	4200
4400	1-4781E 03	4.20309	29.6040	33.8091	8.35224	58.8320	67.1842	8.3522E 04	2.5884E 05	4400
4600	1-5948E 03	4.21774	29.7931	34.0109	8.38134	59.2039	67.5852	8.3813E 04	2.7234E 05	4600
4800	1-7163E 03	4.23152	29.9729	34.2045	8.40873	59.5612	67.9699	8.4087E 04	2.8599E 05	4800
5000	1-8425E 03	4.24453	30.1459	34.3905	8.43458	59.9050	68.3393	8.4346E 04	2.9982E 05	5000
5200	1-9735E 03	4.25684	30.3127	34.5695	8.45908	60.2363	68.6953	8.4591E 04	3.1373E 05	5200
5400	2-1092E 03	4.26859	30.4755	34.7421	8.48239	60.5559	69.0383	8.4824E 04	3.2780E 05	5400
5600	2-2498E 03	4.27978	30.6290	34.9088	8.50464	60.8648	69.3685	8.5046E 04	3.4204E 05	5600
5800	2-3952E 03	4.29051	30.7793	35.0699	8.52596	61.1636	69.6866	8.5260E 04	3.5645E 05	5800
6000	2-5456E 03	4.30085	30.9250	35.2258	8.54650	61.4530	69.9995	8.5465E 04	3.7102E 05	6000
6200	2-7009E 03	4.31087	31.0662	35.3770	8.56642	61.7336	70.3080	8.5664E 04	3.8575E 05	6200
6400	2-8611E 03	4.32064	31.2032	35.5236	8.58582	62.0059	70.5917	8.5858E 04	3.9984E 05	6400
6600	3-0265E 03	4.33021	31.3363	35.6665	8.60484	62.2704	70.8752	8.6048E 04	4.1408E 05	6600
6800	3-1969E 03	4.33967	31.4657	35.8054	8.62364	62.5275	71.1512	8.6236E 04	4.2851E 05	6800
7000	3-3724E 03	4.34907	31.5916	35.9407	8.64233	62.7778	71.4201	8.6423E 04	4.4344E 05	7000
7200	3-5532E 03	4.35850	31.7143	36.0728	8.66107	63.0215	71.6826	8.6611E 04	4.5875E 05	7200
7400	3-7393E 03	4.36802	31.8338	36.2018	8.67998	63.2591	71.9390	8.6799E 04	4.7442E 05	7400
7600	3-9308E 03	4.37771	31.9504	36.3282	8.69924	63.4908	72.1900	8.6992E 04	4.8998E 05	7600
7800	4-1378E 03	4.38765	32.0643	36.4519	8.71899	63.7170	72.4340	8.7190E 04	5.0641E 05	7800
8000	4-3505E 03	4.39791	32.1755	36.5734	8.73938	63.9380	72.6774	8.7394E 04	5.2346E 05	8000
8200	4-5688E 03	4.40854	32.2842	36.6928	8.76054	64.1541	72.9144	8.7605E 04	5.4096E 05	8200
8400	4-7931E 03	4.41967	32.3906	36.8103	8.78242	64.3654	73.1481	8.7824E 04	5.5897E 05	8400
8600	4-9734E 03	4.43133	32.4947	36.9260	8.80578	64.5724	73.3782	8.8058E 04	5.7750E 05	8600
8800	5-1999E 03	4.44358	32.5967	37.0403	8.83013	64.7751	73.6052	8.8301E 04	5.9649E 05	8800
9000	5-4320E 03	4.45631	32.6967	37.1532	8.85583	64.9738	73.8294	8.8558E 04	6.1594E 05	9000
9200	5-6724E 03	4.47018	32.7948	37.2650	8.88298	65.1688	74.0517	8.8830E 04	6.3584E 05	9200
9400	5-9180E 03	4.48463	32.8911	37.3758	8.91170	65.3601	74.2718	8.9117E 04	6.5618E 05	9400
9600	6-1723E 03	4.49953	32.9857	37.4856	8.94211	65.5480	74.4901	8.9421E 04	6.7694E 05	9600
9800	6-4333E 03	4.51612	33.0786	37.5948	8.97427	65.7327	74.7070	8.9743E 04	6.9818E 05	9800

TABLE N7 (CONT.). IDEAL GAS FUNCTIONS FOR N2

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E_0}{RT}$	$\ln \frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\ln \frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\ln \frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\ln \frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\ln \frac{h^2-E_0}{RT}$	TEMP. (°K)
10000	6.7019E 03	4.53323	33.1701	37.7033	9.00829	65.9144	76.9227	7.0211E 04	9.0003E 04	6.5914E 05	10000	
10500	7.4090E 03	4.58026	33.3924	37.9728	9.10178	66.3561	77.4379	7.4703E 04	9.5349E 04	6.9674E 05	10500	
11000	8.1718E 03	4.63360	33.6064	38.2402	9.20172	66.7819	77.9897	7.9428E 04	1.0120E 05	7.3406E 05	11000	
11500	8.9933E 03	4.69315	33.8139	38.5070	9.32666	67.1934	78.5199	8.4272E 04	1.0723E 05	7.7273E 05	11500	
12000	9.8900E 03	4.75857	34.0150	38.7734	9.45607	67.5934	79.0495	8.8927E 04	1.1347E 05	8.1112E 05	12000	
12500	1.0841E 04	4.82920	34.2107	39.0399	9.59642	67.9823	79.5787	9.3116E 04	1.1966E 05	8.4978E 05	12500	
13000	1.1917E 04	4.90413	34.4015	39.3057	9.74532	68.3615	80.1068	9.7663E 04	1.2604E 05	8.9780E 05	13000	
13500	1.3047E 04	4.98223	34.5881	39.5703	9.90352	68.7322	80.6327	1.0233E 05	1.3246E 05	9.4780E 05	13500	
14000	1.4323E 04	5.06227	34.7707	39.8330	10.05937	69.0951	81.1547	1.0301E 05	1.4003E 05	9.9733E 05	14000	
14500	1.5692E 04	5.14293	34.9497	40.0927	10.21986	69.4509	81.6708	1.0373E 05	1.4795E 05	1.0670E 06	14500	
15000	1.7184E 04	5.22294	35.1255	40.3484	10.37625	69.8001	82.1789	1.0448E 05	1.5586E 05	1.1406E 06	15000	
15500	1.8814E 04	5.30107	35.2980	40.5991	10.53111	70.1430	82.6771	1.0524E 05	1.6388E 05	1.2137E 06	15500	
16000	2.0590E 04	5.37625	35.4675	40.8437	10.68331	70.4798	83.1633	1.0601E 05	1.7182E 05	1.2893E 06	16000	
16500	2.2520E 04	5.44735	35.6340	41.0814	10.83318	70.8107	83.6559	1.0678E 05	1.7983E 05	1.3666E 06	16500	
17000	2.4616E 04	5.51420	35.7977	41.3115	10.97962	71.1359	84.1393	1.0756E 05	1.8785E 05	1.4460E 06	17000	
17500	2.6888E 04	5.57563	35.9584	41.5340	11.07970	71.4553	84.6140	1.0834E 05	1.9586E 05	1.5269E 06	17500	
18000	2.9345E 04	5.63145	36.1163	41.7477	11.19082	71.7690	85.0796	1.0912E 05	2.0388E 05	1.6080E 06	18000	
18500	3.1994E 04	5.68142	36.2713	41.9527	11.28992	72.0770	85.5369	1.0990E 05	2.1190E 05	1.6894E 06	18500	
19000	3.4850E 04	5.72544	36.4234	42.1488	11.37740	72.3793	85.9857	1.1068E 05	2.1992E 05	1.7710E 06	19000	
19500	3.7915E 04	5.76355	36.5725	42.3361	11.45313	72.6758	86.4289	1.1146E 05	2.2794E 05	1.8530E 06	19500	
20000	4.1190E 04	5.79588	36.7189	42.5148	11.51738	72.9664	86.8640	1.1224E 05	2.3596E 05	1.9353E 06	20000	
20500	4.4641E 04	5.87230	37.2754	43.1479	11.64923	73.2519	87.2919	1.1302E 05	2.4398E 05	2.0176E 06	20500	
21000	4.8291E 04	5.94963	37.7872	43.6449	11.80379	73.5379	87.7133	1.1380E 05	2.5199E 05	2.1000E 06	21000	
21500	5.2141E 04	6.02715	38.2545	44.1095	11.94304	73.8240	88.1307	1.1458E 05	2.5999E 05	2.1824E 06	21500	
22000	5.6191E 04	6.10468	38.7268	44.5444	12.07046	74.1101	88.5440	1.1536E 05	2.6799E 05	2.2648E 06	22000	
22500	6.0441E 04	6.18230	39.2018	44.9494	12.18891	74.3961	88.9534	1.1614E 05	2.7599E 05	2.3472E 06	22500	
23000	6.4891E 04	6.26003	39.6785	45.3257	12.29954	74.6819	89.3589	1.1692E 05	2.8399E 05	2.4296E 06	23000	
23500	6.9541E 04	6.33785	39.9452	45.6827	12.40339	74.9674	89.7603	1.1770E 05	2.9199E 05	2.5120E 06	23500	
24000	7.4391E 04	6.41568	40.2125	46.0200	12.50046	75.2529	90.1577	1.1848E 05	3.0000E 05	2.5944E 06	24000	
24500	7.9441E 04	6.49350	40.4800	46.3375	12.59171	75.5384	90.5510	1.1926E 05	3.0800E 05	2.6768E 06	24500	
25000	8.4691E 04	6.57133	40.7475	46.6450	12.67716	75.8239	90.9403	1.2004E 05	3.1600E 05	2.7600E 06	25000	
25500	9.0141E 04	6.64915	41.0150	46.9425	12.75691	76.1094	91.3257	1.2082E 05	3.2400E 05	2.8424E 06	25500	
26000	9.5791E 04	6.72698	41.2825	47.2300	12.83116	76.3949	91.7071	1.2160E 05	3.3200E 05	2.9248E 06	26000	
26500	1.0154E 05	6.80480	41.5500	47.5175	12.90091	76.6804	92.0846	1.2238E 05	3.4000E 05	3.0092E 06	26500	
27000	1.0739E 05	6.88263	41.8175	47.8050	12.96616	76.9659	92.4581	1.2316E 05	3.4800E 05	3.0946E 06	27000	
27500	1.1344E 05	6.96045	42.0850	48.0925	13.02691	77.2514	92.8286	1.2394E 05	3.5600E 05	3.1800E 06	27500	
28000	1.1969E 05	7.03828	42.3525	48.3800	13.08316	77.5369	93.1951	1.2472E 05	3.6400E 05	3.2664E 06	28000	
28500	1.2614E 05	7.11610	42.6200	48.6675	13.13491	77.8224	93.5576	1.2550E 05	3.7200E 05	3.3528E 06	28500	
29000	1.3279E 05	7.19393	42.8875	48.9550	13.18216	78.1079	93.9161	1.2628E 05	3.8000E 05	3.4400E 06	29000	
29500	1.3964E 05	7.27175	43.1550	49.2425	13.22491	78.3934	94.2716	1.2706E 05	3.8800E 05	3.5280E 06	29500	
30000	1.4669E 05	7.34958	43.4225	49.5300	13.26316	78.6789	94.6231	1.2784E 05	3.9600E 05	3.6164E 06	30000	
30500	1.5394E 05	7.42740	43.6900	49.8175	13.30041	78.9644	94.9706	1.2862E 05	4.0400E 05	3.7056E 06	30500	
31000	1.6139E 05	7.50523	43.9575	50.1050	13.33316	79.2499	95.3141	1.2940E 05	4.1200E 05	3.7960E 06	31000	
31500	1.6904E 05	7.58305	44.2250	50.3925	13.36591	79.5354	95.6536	1.3018E 05	4.2000E 05	3.8864E 06	31500	
32000	1.7689E 05	7.66088	44.4925	50.6800	13.39816	79.8209	95.9891	1.3096E 05	4.2800E 05	3.9776E 06	32000	
32500	1.8494E 05	7.73870	44.7600	50.9675	13.42591	80.1064	96.3206	1.3174E 05	4.3600E 05	4.0696E 06	32500	
33000	1.9319E 05	7.81653	45.0275	51.2550	13.45316	80.3919	96.6481	1.3252E 05	4.4400E 05	4.1620E 06	33000	
33500	2.0164E 05	7.89435	45.2950	51.5425	13.48041	80.6774	96.9716	1.3330E 05	4.5200E 05	4.2552E 06	33500	
34000	2.1029E 05	7.97218	45.5625	51.8300	13.50766	80.9629	97.2911	1.3408E 05	4.6000E 05	4.3496E 06	34000	
34500	2.1914E 05	8.04999	45.8300	52.1175	13.53491	81.2484	97.6066	1.3486E 05	4.6800E 05	4.4448E 06	34500	
35000	2.2819E 05	8.12782	46.0975	52.4050	13.56216	81.5339	97.9181	1.3564E 05	4.7600E 05	4.5408E 06	35000	
35500	2.3744E 05	8.20564	46.3650	52.6925	13.58941	81.8194	98.2256	1.3642E 05	4.8400E 05	4.6376E 06	35500	
36000	2.4689E 05	8.28347	46.6325	52.9800	13.61666	82.1049	98.5291	1.3720E 05	4.9200E 05	4.7352E 06	36000	
36500	2.5654E 05	8.36130	46.9000	53.2675	13.64391	82.3904	98.8286	1.3798E 05	5.0000E 05	4.8336E 06	36500	
37000	2.6639E 05	8.43913	47.1675	53.5550	13.67116	82.6759	99.1241	1.3876E 05	5.0800E 05	4.9328E 06	37000	
37500	2.7644E 05	8.51695	47.4350	53.8425	13.69841	82.9614	99.4156	1.3954E 05	5.1600E 05	5.0328E 06	37500	
38000	2.8669E 05	8.59478	47.7025	54.1300	13.72566	83.2469	99.7031	1.4032E 05	5.2400E 05	5.1336E 06	38000	
38500	2.9714E 05	8.67260	47.9700	54.4175	13.75291	83.5324	99.9876	1.4110E 05	5.3200E 05	5.2352E 06	38500	
39000	3.0779E 05	8.75043	48.2375	54.7050	13.78016	83.8179	100.2691	1.4188E 05	5.4000E 05	5.3364E 06	39000	
39500	3.1864E 05	8.82825	48.5050	54.9925	13.80741	84.1034	100.5476	1.4266E 05	5.4800E 05	5.4384E 06	39500	
40000	3.2969E 05	8.90608	48.7725	55.2800	13.83466	84.3889	100.8221	1.4344E 05	5.5600E 05	5.5408E 06	40000	

TABLE 88. IDEAL GAS FUNCTIONS FOR N₂* (MOLECULAR WEIGHT 28.0129, R = 1.98717 CAL/MOLE, 8 STATES INCLUDED)

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 E^2}{RT^2}$	$\frac{h^2 E^2}{RT^2} - \frac{E^2}{T^2}$	$\frac{h^2 E^2}{RT^2}$	$\frac{h^2 E^2}{RT^2} - \frac{E^2}{T^2}$	$\frac{h^2 E^2}{RT^2}$	$\frac{h^2 E^2}{RT^2} - \frac{E^2}{T^2}$	$\frac{h^2 E^2}{RT^2}$	$\frac{h^2 E^2}{RT^2} - \frac{E^2}{T^2}$	TEMP. (°K)
1000	3.8059E 02	3.64675	24.5451	28.1918	7.24669	48.7751	56.0218	5.2595E 03	7.2467E 03	1000
1200	4.7189E 02	3.71419	25.2159	28.9301	7.38071	50.1082	57.4899	6.4723E 03	7.2467E 03	1200
1400	5.7181E 02	3.78001	25.7934	29.5734	7.51151	51.2558	58.7873	7.6473E 03	7.2467E 03	1400
1600	6.8124E 02	3.84396	26.3024	30.1463	7.63859	52.3697	59.9957	8.8723E 03	7.2467E 03	1600
1800	8.0100E 02	3.90693	26.7588	30.6457	7.76372	53.4741	60.9978	1.0390E 04	7.2467E 03	1800
2000	9.3201E 02	3.96982	27.1736	31.1435	7.88868	54.5785	61.8872	1.1803E 04	7.2467E 03	2000
2200	1.0753E 03	4.03303	27.5550	31.6407	8.01430	55.6733	62.7706	1.3240E 04	7.2467E 03	2200
2400	1.2321E 03	4.09653	27.9066	32.0951	8.14048	56.7590	63.5995	1.4740E 04	7.2467E 03	2400
2600	1.4034E 03	4.15991	28.2290	32.5989	8.26662	57.8354	64.3820	1.6340E 04	7.2467E 03	2600
2800	1.5910E 03	4.22257	28.5296	33.1272	8.39094	58.9026	65.1237	1.7931E 04	7.2467E 03	2800
3000	1.7959E 03	4.28389	28.8040	33.6769	8.51200	59.9598	65.8286	1.9577E 04	7.2467E 03	3000
3200	2.0183E 03	4.34326	29.1214	34.2447	8.63077	61.0069	66.4998	2.1240E 04	7.2467E 03	3200
3400	2.2510E 03	4.40018	29.4786	34.8366	8.74788	62.0469	67.1386	2.2911E 04	7.2467E 03	3400
3600	2.5243E 03	4.45425	29.8695	35.4537	8.86353	63.0796	67.7469	2.4582E 04	7.2467E 03	3600
3800	2.8095E 03	4.50524	29.8817	36.0969	8.97825	64.1067	68.3325	2.6243E 04	7.2467E 03	3800
4000	3.1177E 03	4.55299	30.1140	36.7670	9.09154	65.1298	68.8991	2.7894E 04	7.2467E 03	4000
4200	3.4499E 03	4.59747	30.3372	37.4634	9.20354	66.1488	69.4511	2.9525E 04	7.2467E 03	4200
4400	3.8072E 03	4.63873	30.5521	38.1808	9.31429	67.1639	69.9890	3.1136E 04	7.2467E 03	4400
4600	4.1904E 03	4.67684	30.7591	38.9210	9.42380	68.1754	70.5123	3.2727E 04	7.2467E 03	4600
4800	4.6007E 03	4.71201	30.9589	39.6769	9.53202	69.1834	71.0219	3.4298E 04	7.2467E 03	4800
5000	5.0389E 03	4.74436	31.1519	40.4483	9.63895	70.1879	71.5277	3.5849E 04	7.2467E 03	5000
5200	5.5057E 03	4.77411	31.3386	41.2347	9.74459	71.1888	72.0297	3.7380E 04	7.2467E 03	5200
5400	6.0022E 03	4.80146	31.5193	42.0360	9.84894	72.1861	72.5273	3.8891E 04	7.2467E 03	5400
5600	6.5292E 03	4.82641	31.6944	42.8510	9.95202	73.2889	73.0207	4.0382E 04	7.2467E 03	5600
5800	7.0875E 03	4.84978	31.8642	43.6760	10.0538	74.3881	73.5102	4.1853E 04	7.2467E 03	5800
6000	7.6780E 03	4.87117	32.0289	44.5101	10.1543	75.4836	74.0000	4.3304E 04	7.2467E 03	6000
6200	8.3015E 03	4.89096	32.1890	45.3539	10.2535	76.5754	74.4900	4.4735E 04	7.2467E 03	6200
6400	8.9599E 03	4.90933	32.3446	46.2080	10.3513	77.6634	74.9800	4.6146E 04	7.2467E 03	6400
6600	9.6509E 03	4.92645	32.4959	47.0724	10.4478	78.7477	75.4700	4.7537E 04	7.2467E 03	6600
6800	1.0378E 04	4.94247	32.6432	47.9467	10.5430	79.8284	75.9600	4.8908E 04	7.2467E 03	6800
7000	1.1142E 04	4.95753	32.7867	48.8301	10.6369	80.9054	76.4500	5.0259E 04	7.2467E 03	7000
7200	1.1943E 04	4.97176	32.9264	49.7224	10.7294	81.9869	76.9400	5.1590E 04	7.2467E 03	7200
7400	1.2781E 04	4.98528	33.0630	50.6240	10.8206	83.0639	77.4300	5.2901E 04	7.2467E 03	7400
7600	1.3661E 04	4.99818	33.1961	51.5360	10.9105	84.1464	77.9200	5.4192E 04	7.2467E 03	7600
7800	1.4579E 04	5.01055	33.3261	52.4584	11.0000	85.2244	78.4100	5.5473E 04	7.2467E 03	7800
8000	1.5538E 04	5.02247	33.4531	53.3913	11.0892	86.3079	78.9000	5.6744E 04	7.2467E 03	8000
8200	1.6539E 04	5.03400	33.5773	54.3347	11.1771	87.3869	79.3900	5.8005E 04	7.2467E 03	8200
8400	1.7583E 04	5.04520	33.6987	55.2880	11.2636	88.4614	79.8800	5.9256E 04	7.2467E 03	8400
8600	1.8671E 04	5.05612	33.8175	56.2513	11.3487	89.5324	80.3700	6.0497E 04	7.2467E 03	8600
8800	1.9803E 04	5.06678	33.9339	57.2247	11.4324	90.6000	80.8600	6.1728E 04	7.2467E 03	8800
9000	2.0982E 04	5.07721	34.0479	58.2080	11.5147	91.6649	81.3500	6.2949E 04	7.2467E 03	9000
9200	2.2207E 04	5.08745	34.1596	59.2013	11.5957	92.7269	81.8400	6.4160E 04	7.2467E 03	9200
9400	2.3480E 04	5.09749	34.2691	60.2046	11.6754	93.7859	82.3300	6.5361E 04	7.2467E 03	9400
9600	2.4802E 04	5.10735	34.3765	61.2179	11.7538	94.8419	82.8200	6.6552E 04	7.2467E 03	9600
9800	2.6175E 04	5.11703	34.4819	62.2413	11.8309	95.8949	83.3100	6.7733E 04	7.2467E 03	9800
9900										9900

TABLE 88 (CONT.). IDEAL GAS FUNCTIONS FOR N_2

TEMP. (°C)	PARIT. PUNCT.	H ₂ -S ₂ RT	-S ₂ -S ₂ RT	S ₂ H	H ₂ -S ₂ PT -CAL/MOLE	-H ₂ -S ₂ PT -CAL/MOLE	S ₂ -S ₂ -CAL/MOLE	H ₂ -S ₂ -CAL/MOLE	TEMP. (°C)
10000	2.7599E 04	5.12652	34.5854	39.7119	10.18724	46.7270	78.9152	1.0719E 05	6.8727E 05
10500	3.1390E 04	5.16438	34.8361	39.9855	10.23358	46.7251	79.4578	1.0744E 05	7.2604E 05
11000	3.5252E 04	5.17087	35.0747	40.2570	10.27316	46.7231	80.0000	1.1062E 05	7.6467E 05
11500	4.0021E 04	5.19075	35.3265	40.4972	10.31488	46.7190	80.5477	1.1368E 05	8.0388E 05
12000	4.4894E 04	5.20574	35.5378	40.7365	10.35807	46.7199	80.9502	1.1664E 05	8.4719E 05
12500	4.9816E 04	5.22465	35.7407	40.9654	10.39225	46.7197	81.4050	1.2051E 05	8.8779E 05
13000	5.5032E 04	5.23822	35.9459	41.1841	10.40922	46.7195	81.8397	1.2532E 05	9.2664E 05
13500	6.0242E 04	5.24934	36.1536	41.3931	10.43127	46.7187	82.2550	1.4002E 05	9.6462E 05
14000	6.5474E 04	5.25784	36.3349	41.5927	10.44819	46.7180	82.6516	1.4427E 05	1.0100E 06
14500	7.5410E 04	5.26373	36.5195	41.7832	10.45990	46.7173	83.0362	1.5167E 05	1.0522E 06
15000	8.2823E 04	5.26700	36.6980	41.9650	10.46640	46.7169	83.3914	1.5700E 05	1.0999E 06
15500	9.0490E 04	5.26769	36.8707	42.1384	10.46778	46.7165	83.7140	1.6225E 05	1.1397E 06
16000	9.9017E 04	5.26589	37.0380	42.3038	10.46420	46.7160	84.0047	1.6745E 05	1.1774E 06
16500	1.0781E 05	5.26172	37.1999	42.4617	10.45990	46.7155	84.2733	1.7262E 05	1.2187E 06
17000	1.1706E 05	5.25530	37.3569	42.6122	10.45514	46.7150	84.5375	1.7775E 05	1.2620E 06
17500	1.2678E 05	5.24679	37.5091	42.7559	10.42422	46.7149	84.9431	1.8246E 05	1.3044E 06
18000	1.3696E 05	5.23633	37.6568	42.8931	10.40595	46.7148	85.2337	1.8703E 05	1.3490E 06
18500	1.4760E 05	5.22410	37.8001	43.0242	10.38116	46.7147	85.5182	1.9205E 05	1.3969E 06
19000	1.5869E 05	5.21027	37.9392	43.1495	10.35361	46.7146	85.7934	1.9672E 05	1.4324E 06
19500	1.7023E 05	5.19498	38.0764	43.2684	10.32329	46.7145	85.9601	2.0130E 05	1.4759E 06
20000	1.8222E 05	5.17841	38.2057	43.3841	10.29035	46.7144	86.2114	2.0581E 05	1.5184E 06
22000	2.3459E 05	5.10198	38.6958	43.7978	10.13847	46.7144	87.0336	2.2305E 05	1.6917E 06
24000	2.9278E 05	5.01508	39.1360	44.1511	9.96580	46.7143	87.7356	2.3910E 05	1.8643E 06
26000	3.5669E 05	4.92352	39.5339	44.5474	9.76380	46.7142	88.3442	2.5430E 05	2.0438E 06
28000	4.2566E 05	4.83115	39.8953	44.7265	9.60034	46.7141	88.8789	2.6881E 05	2.2190E 06
30000	4.9939E 05	4.74043	40.2256	44.9660	9.42001	46.7140	89.3548	2.8260E 05	2.3900E 06
32000	5.7430E 05	4.65280	40.5287	45.1815	9.23888	46.7139	89.7831	2.9587E 05	2.5772E 06
34000	6.5271E 05	4.56507	40.8082	45.3773	9.07950	46.7138	90.1732	3.0870E 05	2.7572E 06
36000	7.3599E 05	4.48961	41.0671	45.5567	8.92159	46.7137	90.5287	3.2186E 05	2.9379E 06
38000	8.1458E 05	4.41452	41.3078	45.7223	8.71739	46.7136	90.8579	3.3335E 05	3.1192E 06
40000	8.9700E 05	4.34376	41.5324	45.8762	8.60377	46.7135	91.1636	3.4527E 05	3.3013E 06

TABLE B9 (CONT.). IDEAL GAS FUNCTIONS FOR NO

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2}{RT}$	$\ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	TEMP. (°K)
10000	7.9451E 04	4.82983	35.7421	40.3719	9.20024	71.0255	80.2237	7.2131E 04
10500	8.7874E 04	4.85441	35.9487	40.6251	9.25346	71.5757	80.7287	7.2670E 04
11000	9.7205E 04	4.88088	36.1858	40.8667	9.30169	71.9973	81.2099	7.3232E 04
11500	1.0715E 05	4.70285	36.3944	41.0973	9.34535	72.3217	81.6671	7.3819E 04
12000	1.1773E 05	4.72207	36.5950	41.3170	9.38393	72.7203	82.1036	7.4434E 04
12500	1.2894E 05	4.73834	36.7881	41.5264	9.41837	73.1040	82.5199	7.5079E 04
13000	1.4083E 05	4.75159	36.9742	41.7258	9.44919	73.5736	82.9140	7.5754E 04
13500	1.5333E 05	4.76180	37.1537	41.9155	9.47642	74.0306	83.2931	7.6460E 04
14000	1.6652E 05	4.76902	37.3270	42.0960	9.49944	74.4750	83.6518	7.7198E 04
14500	1.8033E 05	4.77335	37.4945	42.2678	9.51864	74.9077	83.9931	7.7968E 04
15000	1.9479E 05	4.77695	37.6563	42.4313	9.53396	75.3293	84.3180	7.8770E 04
15500	2.0987E 05	4.77997	37.8129	42.5869	9.54647	75.7405	84.6271	7.9604E 04
16000	2.2557E 05	4.78261	37.9644	42.7360	9.55709	76.1415	84.9211	8.0470E 04
16500	2.4188E 05	4.78506	38.1111	42.8782	9.56596	76.5331	85.2021	8.1370E 04
17000	2.5877E 05	4.78751	38.2533	43.0168	9.57332	76.9156	85.4705	8.2304E 04
17500	2.7633E 05	4.78916	38.3910	43.1502	9.57938	77.2893	85.7247	8.3274E 04
18000	2.9455E 05	4.79000	38.5246	43.2789	9.58414	77.6544	85.9645	8.4280E 04
18500	3.1348E 05	4.79015	38.6543	43.3791	9.58760	78.0124	86.1914	8.5322E 04
19000	3.3318E 05	4.79001	38.7801	43.4593	9.59004	78.3625	86.4053	8.6400E 04
19500	3.5361E 05	4.78960	38.9023	43.5267	9.59153	78.7053	86.6070	8.7514E 04
20000	3.7474E 05	4.78894	39.0210	43.5701	9.59208	79.0412	86.7972	8.8664E 04
20500	3.9657E 05	4.78805	39.1359	43.6000	9.59170	79.3703	86.9764	8.9850E 04
21000	4.1910E 05	4.78694	39.2469	43.6168	9.59040	79.6927	87.1445	9.1072E 04
21500	4.4233E 05	4.78562	39.3538	43.6208	9.58818	79.9977	87.3017	9.2330E 04
22000	4.6626E 05	4.78410	39.4568	43.6199	9.58505	80.2955	87.4484	9.3624E 04
22500	4.9089E 05	4.78238	39.5559	43.6149	9.58101	80.5863	87.5851	9.4954E 04
23000	5.1622E 05	4.78047	39.6511	43.6059	9.57607	80.8703	87.7127	9.6320E 04
23500	5.4227E 05	4.77837	39.7425	43.5929	9.57033	81.1477	87.8311	9.7722E 04
24000	5.6904E 05	4.77609	39.8299	43.5760	9.56380	81.4185	87.9411	9.9160E 04
24500	5.9654E 05	4.77364	39.9134	43.5552	9.55648	81.6827	88.0434	1.0000E 05
25000	6.2478E 05	4.77102	39.9929	43.5306	9.54837	81.9403	88.1389	1.0944E 05
25500	6.5377E 05	4.76824	40.0685	43.5023	9.53948	82.1919	88.2274	1.1894E 05
26000	6.8352E 05	4.76530	40.1402	43.4704	9.52981	82.4375	88.3099	1.2850E 05
26500	7.1404E 05	4.76222	40.2080	43.4350	9.51937	82.6773	88.3864	1.3812E 05
27000	7.4534E 05	4.75900	40.2719	43.3962	9.50816	82.9115	88.4579	1.4780E 05
27500	7.7744E 05	4.75564	40.3320	43.3540	9.49618	83.1403	88.5244	1.5754E 05
28000	8.1034E 05	4.75215	40.3893	43.3086	9.48343	83.3637	88.5869	1.6734E 05
28500	8.4404E 05	4.74854	40.4438	43.2600	9.46991	83.5825	88.6454	1.7720E 05
29000	8.7854E 05	4.74482	40.4955	43.2083	9.45563	83.7967	88.6999	1.8712E 05
29500	9.1384E 05	4.74100	40.5444	43.1536	9.44060	83.9963	88.7494	1.9710E 05
30000	9.4994E 05	4.73708	40.5906	43.0960	9.42483	84.1915	88.7949	2.0714E 05
30500	9.8684E 05	4.73307	40.6341	43.0356	9.40832	84.3741	88.8364	2.1724E 05
31000	1.0245E 06	4.72897	40.6750	42.9724	9.39107	84.5483	88.8739	2.2740E 05
31500	1.0608E 06	4.72478	40.7133	42.9066	9.37309	84.7141	88.9074	2.3762E 05
32000	1.0974E 06	4.72050	40.7490	42.8383	9.35438	84.8715	88.9369	2.4790E 05
32500	1.1342E 06	4.71613	40.7822	42.7676	9.33495	85.0205	88.9624	2.5824E 05
33000	1.1713E 06	4.71168	40.8130	42.6945	9.31480	85.1611	88.9839	2.6864E 05
33500	1.2087E 06	4.70715	40.8414	42.6190	9.29393	85.2935	89.0014	2.7910E 05
34000	1.2464E 06	4.70254	40.8675	42.5413	9.27234	85.4187	89.0159	2.8962E 05
34500	1.2844E 06	4.69785	40.8914	42.4615	9.25003	85.5367	89.0274	2.9920E 05
35000	1.3227E 06	4.69308	40.9131	42.3796	9.22700	85.6475	89.0359	3.0884E 05
35500	1.3613E 06	4.68823	40.9326	42.2957	9.20325	85.7511	89.0414	3.1854E 05
36000	1.4002E 06	4.68330	40.9500	42.2098	9.17878	85.8475	89.0449	3.2830E 05
36500	1.4394E 06	4.67829	40.9654	42.1220	9.15359	85.9369	89.0464	3.3812E 05
37000	1.4789E 06	4.67320	40.9789	42.0323	9.12768	86.0193	89.0459	3.4800E 05
37500	1.5187E 06	4.66803	40.9904	41.9407	9.10105	86.0947	89.0434	3.5794E 05
38000	1.5588E 06	4.66278	41.0000	41.8472	9.07370	86.1627	89.0389	3.6794E 05
38500	1.5992E 06	4.65745	41.0077	41.7518	9.04563	86.2241	89.0324	3.7800E 05
39000	1.6399E 06	4.65204	41.0135	41.6545	9.01684	86.2791	89.0239	3.8812E 05
39500	1.6808E 06	4.64655	41.0174	41.5553	8.98733	86.3275	89.0134	3.9830E 05
40000	1.7220E 06	4.64100	41.0194	41.4542	8.95711	86.3693	89.0019	4.0854E 05

TABLE 90. IDEAL GAS FUNCTIONS FOR MO+ INMOLECULAR WEIGHT 30.0056, R = 1.98717 CAL/MOLE, 6 STATES INCLUDED

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT} - \frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	$\frac{h^2 E^2}{RT}$	TEMP. (°K)
1000	3.6254E 02	3.62244	24.5996	28.2221	7.19039	48.8835	54.0819	5.2112E 03	7.1904E 03	1.9044E 03	1000
1200	4.4730E 02	3.68433	25.2656	28.9499	7.32137	50.2048	57.5282	6.4010E 03	8.7054E 03	2.8204E 03	1200
1400	5.3934E 02	3.74424	25.8300	29.5823	7.45443	51.3445	59.8961	7.5908E 03	1.0181E 04	3.7523E 03	1400
1600	6.3917E 02	3.79978	26.3417	30.1455	7.55080	52.3453	60.8917	8.6911E 03	1.2081E 04	4.7523E 03	1600
1800	7.4712E 02	3.85027	26.7922	30.6425	7.63111	53.2405	61.7930	9.6911E 03	1.3977E 04	5.7523E 03	1800
2000	8.6341E 02	3.89578	27.2003	31.0961	7.70156	54.0314	62.6161	1.0590E 04	1.5869E 04	6.7523E 03	2000
2200	9.8820E 02	3.93475	27.5735	31.5103	7.76223	54.7132	63.3733	1.1482E 04	1.7754E 04	7.7523E 03	2200
2400	1.1214E 03	3.96762	27.9177	31.8891	7.81423	55.3445	64.0742	1.2381E 04	1.9639E 04	8.7523E 03	2400
2600	1.2637E 03	4.00493	28.2371	32.2440	7.85843	55.9245	64.7265	1.3281E 04	2.1523E 04	9.7523E 03	2600
2800	1.4146E 03	4.03712	28.5351	32.5723	7.89423	56.4545	65.3345	1.4181E 04	2.3407E 04	1.0752E 04	2800
3000	1.5743E 03	4.06460	28.8146	32.8792	7.92174	56.9345	65.9045	1.5081E 04	2.5291E 04	1.1752E 04	3000
3200	1.7430E 03	4.08972	29.0778	33.1675	7.94123	57.3645	66.4345	1.5981E 04	2.7175E 04	1.2752E 04	3200
3400	1.9207E 03	4.11278	29.3244	33.4392	7.95423	57.7545	66.9245	1.6881E 04	2.9059E 04	1.3752E 04	3400
3600	2.1075E 03	4.13403	29.5621	33.6941	7.96223	58.1045	67.3745	1.7781E 04	3.0943E 04	1.4752E 04	3600
3800	2.3034E 03	4.15370	29.7861	33.9398	7.96623	58.5145	67.7845	1.8681E 04	3.2827E 04	1.5752E 04	3800
4000	2.5085E 03	4.17198	29.9997	34.1714	7.96623	58.8845	68.1545	1.9581E 04	3.4711E 04	1.6752E 04	4000
4200	2.7228E 03	4.18803	30.2036	34.3927	7.96223	59.2145	68.4845	2.0481E 04	3.6595E 04	1.7752E 04	4200
4400	2.9465E 03	4.20201	30.3989	34.6079	7.95423	59.5045	68.7745	2.1381E 04	3.8479E 04	1.8752E 04	4400
4600	3.1795E 03	4.22004	30.5781	34.8082	7.94123	59.7545	69.0245	2.2281E 04	4.0363E 04	1.9752E 04	4600
4800	3.4221E 03	4.23425	30.7460	35.0003	7.92174	60.0045	69.2345	2.3181E 04	4.2247E 04	2.0752E 04	4800
5000	3.6741E 03	4.24775	30.9392	35.1849	7.89423	60.2445	69.4045	2.4081E 04	4.4131E 04	2.1752E 04	5000
5200	3.9358E 03	4.26045	31.1060	35.3467	7.86223	60.4445	69.5345	2.4981E 04	4.6015E 04	2.2752E 04	5200
5400	4.2072E 03	4.27304	31.2671	35.5401	7.82623	60.6045	69.6245	2.5881E 04	4.7900E 04	2.3752E 04	5400
5600	4.4884E 03	4.28500	31.4227	35.7077	7.78623	60.7345	69.6745	2.6781E 04	4.9784E 04	2.4752E 04	5600
5800	4.7795E 03	4.29661	31.5732	35.8699	7.74123	60.8345	69.6945	2.7681E 04	5.1668E 04	2.5752E 04	5800
6000	5.0804E 03	4.30799	31.7191	36.0271	7.69123	60.9045	69.6845	2.8581E 04	5.3552E 04	2.6752E 04	6000
6200	5.3919E 03	4.31919	31.8605	36.1797	7.63623	60.9445	69.6445	2.9481E 04	5.5436E 04	2.7752E 04	6200
6400	5.7135E 03	4.33030	31.9978	36.3281	7.57623	60.9545	69.5745	3.0381E 04	5.7320E 04	2.8752E 04	6400
6600	6.0454E 03	4.34140	32.1313	36.4727	7.51123	60.9445	69.4845	3.1281E 04	5.9204E 04	2.9752E 04	6600
6800	6.3883E 03	4.35256	32.2610	36.6136	7.44123	60.9045	69.3745	3.2181E 04	6.1088E 04	3.0752E 04	6800
7000	6.7418E 03	4.36385	32.3874	36.7512	7.36623	60.8345	69.2445	3.3081E 04	6.2972E 04	3.1752E 04	7000
7200	7.1044E 03	4.37535	32.5105	36.8858	7.28623	60.7345	69.0945	3.3981E 04	6.4856E 04	3.2752E 04	7200
7400	7.4823E 03	4.38711	32.6305	37.0174	7.20123	60.6045	68.9245	3.4881E 04	6.6740E 04	3.3752E 04	7400
7600	7.8697E 03	4.39921	32.7477	37.1449	7.11123	60.4445	68.7345	3.5781E 04	6.8624E 04	3.4752E 04	7600
7800	8.2690E 03	4.41171	32.8621	37.2738	7.01623	60.3445	68.6245	3.6681E 04	7.0508E 04	3.5752E 04	7800
8000	8.6805E 03	4.42467	32.9739	37.3986	6.91623	60.2145	68.4845	3.7581E 04	7.2392E 04	3.6752E 04	8000
8200	9.1045E 03	4.43813	33.0834	37.5215	6.81123	60.0645	68.3145	3.8481E 04	7.4276E 04	3.7752E 04	8200
8400	9.5414E 03	4.45216	33.1905	37.6426	6.70123	60.0045	68.1245	3.9381E 04	7.6160E 04	3.8752E 04	8400
8600	9.9916E 03	4.46678	33.2954	37.7622	6.58623	60.0045	67.9145	4.0281E 04	7.8044E 04	3.9752E 04	8600
8800	1.0456E 04	4.48206	33.3983	37.8803	6.46623	60.0045	67.6845	4.1181E 04	7.9928E 04	4.0752E 04	8800
9000	1.0934E 04	4.49801	33.4992	37.9972	6.34123	60.0045	67.4345	4.2081E 04	8.1812E 04	4.1752E 04	9000
9200	1.1427E 04	4.51468	33.5982	38.1129	6.21123	60.0045	67.1645	4.2981E 04	8.3696E 04	4.2752E 04	9200
9400	1.1935E 04	4.53207	33.6955	38.2276	6.07623	60.0045	66.8745	4.3881E 04	8.5580E 04	4.3752E 04	9400
9600	1.2459E 04	4.55021	33.7911	38.3413	5.93623	60.0045	66.5645	4.4781E 04	8.7464E 04	4.4752E 04	9600
9800	1.2999E 04	4.56912	33.8851	38.4542	5.79123	60.0045	66.2345	4.5681E 04	8.9348E 04	4.5752E 04	9800

TABLE 90 (CONT.). IDEAL GAS FUNCTIONS FOR NO.

TEMP. (°K)	PARTIT. FUNCT.	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	$\frac{H^\circ - G^\circ}{RT}$	TEMP. (°K)
10000	1.3557E 04	4.50879	33.9776	38.5664	9.11668	67.5192	76.6378	7.1315E 04	9.1107E 04	1.1070E 04	6.7919E 05	10000
10500	1.5630E 04	4.64126	34.2028	38.8440	9.22294	77.1895	77.1895	7.1345E 04	9.0641E 04	1.0277E 05	7.5238E 05	10500
11000	1.6626E 04	4.69822	34.4207	39.1182	9.33413	68.3902	77.3343	8.0839E 04	1.0277E 05	1.0277E 05	7.5238E 05	11000
11500	1.8357E 04	4.75918	34.6302	39.3893	9.45728	68.8158	78.2721	8.5904E 04	1.0877E 05	1.0877E 05	7.9136E 05	11500
12000	2.0237E 04	4.82363	34.8340	39.6575	9.58496	69.2210	78.8060	9.1174E 04	1.1502E 05	1.1502E 05	8.3065E 05	12000
12500	2.2280E 04	4.89010	35.0323	39.9224	9.71744	69.6150	79.3324	9.6628E 04	1.2157E 05	1.2157E 05	8.7019E 05	12500
13000	2.4503E 04	4.95818	35.2234	40.1834	9.85272	69.9997	79.8514	1.0229E 05	1.2849E 05	1.2849E 05	9.1000E 05	13000
13500	2.6919E 04	5.02661	35.4138	40.4404	9.98871	70.3731	80.3618	1.0802E 05	1.3482E 05	1.3482E 05	9.5004E 05	13500
14000	2.9546E 04	5.09435	35.5979	40.6922	10.12331	70.7368	80.8621	1.1391E 05	1.4173E 05	1.4173E 05	9.9034E 05	14000
14500	3.2400E 04	5.16038	35.7778	40.9382	10.25453	71.0964	81.3509	1.1980E 05	1.4869E 05	1.4869E 05	1.0309E 06	14500
15000	3.5496E 04	5.22380	35.9538	41.1776	10.38056	71.4462	81.8267	1.2590E 05	1.5571E 05	1.5571E 05	1.0717E 06	15000
15500	3.8850E 04	5.28382	36.1261	41.4099	10.50983	71.7885	82.2883	1.3195E 05	1.6273E 05	1.6273E 05	1.1127E 06	15500
16000	4.2478E 04	5.33981	36.2967	41.6345	10.63108	72.1236	82.7367	1.3798E 05	1.6978E 05	1.6978E 05	1.1540E 06	16000
16500	4.6399E 04	5.39125	36.4648	41.8511	10.74331	72.4517	83.1651	1.4398E 05	1.7677E 05	1.7677E 05	1.1951E 06	16500
17000	5.0613E 04	5.43783	36.6215	42.0593	10.80586	72.7750	83.5786	1.4992E 05	1.8370E 05	1.8370E 05	1.2371E 06	17000
17500	5.5143E 04	5.47931	36.7767	42.2590	10.88829	73.0874	83.9757	1.5577E 05	1.9059E 05	1.9059E 05	1.2790E 06	17500
18000	6.0003E 04	5.51562	36.9346	42.4502	10.96044	73.3922	84.3556	1.6152E 05	1.9729E 05	1.9729E 05	1.3211E 06	18000
18500	6.5201E 04	5.54676	37.0862	42.6329	11.02233	73.6964	84.7187	1.6719E 05	2.0391E 05	2.0391E 05	1.3634E 06	18500
19000	7.0746E 04	5.57286	37.2345	42.8073	11.07619	73.9910	85.0652	1.7265E 05	2.1041E 05	2.1041E 05	1.4058E 06	19000
19500	7.6646E 04	5.59407	37.3795	42.9736	11.11634	74.2792	85.3956	1.7802E 05	2.1677E 05	2.1677E 05	1.4484E 06	19500
20000	8.2909E 04	5.61063	37.5213	43.1320	11.14925	74.5611	85.7104	1.8324E 05	2.2299E 05	2.2299E 05	1.4912E 06	20000
20500	1.1171E 05	5.63589	38.0578	43.6936	11.19944	75.4271	86.0265	2.0267E 05	2.4439E 05	2.4439E 05	1.6638E 06	20500
21000	1.4663E 05	5.66980	38.5473	44.1571	11.14759	76.5999	87.7475	2.1895E 05	2.6754E 05	2.6754E 05	1.8304E 06	21000
21500	1.8766E 05	5.69647	38.9942	44.5438	11.02810	77.4878	88.5159	2.3504E 05	2.8673E 05	2.8673E 05	2.0107E 06	21500
22000	2.3458E 05	5.74688	39.4026	44.8714	10.86757	78.2994	89.1670	2.4865E 05	3.0429E 05	3.0429E 05	2.1924E 06	22000
22500	2.8701E 05	5.77684	39.7768	45.1536	10.68468	79.0430	89.7277	2.6093E 05	3.2054E 05	3.2054E 05	2.3713E 06	22500
23000	3.4451E 05	5.79981	40.1207	45.4005	10.49186	79.7265	90.2184	2.7215E 05	3.3574E 05	3.3574E 05	2.5512E 06	23000
23500	4.0455E 05	5.81180	40.4379	45.6197	10.29709	80.3567	90.6538	2.8254E 05	3.5010E 05	3.5010E 05	2.7321E 06	23500
24000	4.7268E 05	5.88529	40.7313	45.8166	10.10531	80.8398	91.0451	2.9225E 05	3.6378E 05	3.6378E 05	2.9138E 06	24000
24500	5.4213E 05	5.99177	41.0037	45.9955	9.91947	81.4812	91.4007	3.0153E 05	3.7694E 05	3.7694E 05	3.0963E 06	24500
25000	6.1463E 05	6.02064	41.2575	46.1535	9.74117	81.9854	91.7266	3.1016E 05	3.8965E 05	3.8965E 05	3.2794E 06	25000

TABLE 91. IDEAL GAS FUNCTIONS FOR O₂ - MOLECULAR WEIGHT 31.9994, R = 1.98717 CAL/MOLE, 1 STATES INCLUDED

TEMP. (°K)	PARTIT. FUNCT.	$\frac{H^0 - E^0}{RT}$	$\frac{S^0}{R}$	$\ln \frac{P^0 - E^0}{P} - \frac{P^0 - E^0}{RT}$	$\ln \frac{P^0 - E^0}{P} - \frac{P^0 - E^0}{RT}$	$\ln \frac{P^0 - E^0}{P} - \frac{P^0 - E^0}{RT}$	$\ln \frac{P^0 - E^0}{P} - \frac{P^0 - E^0}{RT}$	$\ln \frac{P^0 - E^0}{P} - \frac{P^0 - E^0}{RT}$	$\ln \frac{P^0 - E^0}{P} - \frac{P^0 - E^0}{RT}$	TEMP. (°K)
1000	1.4789E 03	3.90526	30.0073	7.76040	51.8691	59.6295	5.7732E 03	7.7604E 03	5.1869E 04	1000
1200	1.9246E 03	4.03363	30.8249	7.91613	53.2983	61.2144	7.1148E 03	9.4994E 03	6.3950E 04	1200
1400	2.4312E 03	4.04760	31.4879	8.04326	54.9284	62.5717	8.4785E 03	1.1261E 04	7.6330E 04	1400
1600	2.9999E 03	4.10065	32.0880	8.14866	56.6096	63.7582	9.8584E 03	1.3033E 04	8.8975E 04	1600
1800	3.6320E 03	4.14538	32.6154	8.23755	58.2746	64.8122	1.1251E 04	1.4828E 04	1.0163E 05	1800
2000	4.3282E 03	4.18346	33.0924	8.31362	59.9445	65.7602	1.2453E 04	1.6627E 04	1.1449E 05	2000
2200	5.0897E 03	4.21679	33.5259	8.37945	61.6231	66.6215	1.4063E 04	1.8435E 04	1.2813E 05	2200
2400	5.9172E 03	4.24569	33.9230	8.43689	63.3737	67.4106	1.5479E 04	2.0249E 04	1.4154E 05	2400
2600	6.8116E 03	4.27102	34.2892	8.48723	65.1311	68.1383	1.6900E 04	2.2067E 04	1.5509E 05	2600
2800	7.7733E 03	4.29327	34.6268	8.53144	66.8917	68.8131	1.8324E 04	2.3888E 04	1.6879E 05	2800
3000	8.8031E 03	4.31281	34.9432	8.57027	68.6516	69.4419	1.9749E 04	2.5711E 04	1.8261E 05	3000
3200	9.9012E 03	4.32984	35.2412	8.60431	70.4135	70.0302	2.1175E 04	2.7534E 04	1.9650E 05	3200
3400	1.1048E 04	4.34493	35.5192	8.63409	72.1782	70.5825	2.2600E 04	2.9356E 04	2.1062E 05	3400
3600	1.2204E 04	4.35800	35.7810	8.66004	73.9468	71.1027	2.4022E 04	3.1176E 04	2.2479E 05	3600
3800	1.3388E 04	4.36934	36.0283	8.68261	75.7195	71.5941	2.5443E 04	3.2994E 04	2.3906E 05	3800
4000	1.4581E 04	4.37914	36.2424	8.70208	77.4962	72.0595	2.6860E 04	3.4808E 04	2.5343E 05	4000
4200	1.5783E 04	4.38754	36.4837	8.71877	79.2784	72.5012	2.8273E 04	3.6619E 04	2.6789E 05	4200
4400	1.6994E 04	4.39467	36.6561	8.73294	81.0648	72.9213	2.9681E 04	3.8425E 04	2.8243E 05	4400
4600	1.8212E 04	4.40063	36.8576	8.74479	82.8576	73.3216	3.1085E 04	4.0226E 04	2.9705E 05	4600
4800	2.1158E 04	4.40551	37.0898	8.75449	84.6572	73.7037	3.2483E 04	4.2022E 04	3.1176E 05	4800
5000	2.2872E 04	4.40938	37.2736	8.76217	86.4637	74.0689	3.3875E 04	4.3811E 04	3.2653E 05	5000
5200	2.4652E 04	4.41230	37.4496	8.76794	88.2769	74.4185	3.5260E 04	4.5593E 04	3.4138E 05	5200
5400	2.6498E 04	4.41431	37.6181	8.77133	90.0963	74.7534	3.6638E 04	4.7369E 04	3.5630E 05	5400
5600	2.8409E 04	4.41545	37.7798	8.77423	91.9223	75.0748	3.8008E 04	4.9136E 04	3.7128E 05	5600
5800	3.0384E 04	4.41576	37.9351	8.77684	93.7548	75.3833	3.9369E 04	5.0894E 04	3.8632E 05	5800
6000	3.2423E 04	4.41526	38.0853	8.77880	95.5939	75.6798	4.0720E 04	5.2643E 04	4.0144E 05	6000
6200	3.4524E 04	4.41399	38.2278	8.77933	97.4394	75.9649	4.2062E 04	5.4382E 04	4.1660E 05	6200
6400	3.6684E 04	4.41197	38.3639	8.77832	99.2917	76.2393	4.3393E 04	5.6111E 04	4.3182E 05	6400
6600	3.8907E 04	4.40923	38.4988	8.77617	101.1507	76.5036	4.4713E 04	5.7828E 04	4.4710E 05	6600
6800	4.1187E 04	4.40579	38.6270	8.77304	103.0162	76.7582	4.6022E 04	5.9534E 04	4.6242E 05	6800
7000	4.3524E 04	4.40168	38.7565	8.76887	104.8887	77.0037	4.7318E 04	6.1228E 04	4.7780E 05	7000
7200	4.5918E 04	4.39694	38.8857	8.76374	106.7674	77.2406	4.8602E 04	6.2910E 04	4.9322E 05	7200
7400	4.8362E 04	4.39158	38.9948	8.75769	108.6524	77.4692	4.9873E 04	6.4578E 04	5.0869E 05	7400
7600	5.0861E 04	4.38564	39.0934	8.75099	110.5439	77.6899	5.1131E 04	6.6234E 04	5.2421E 05	7600
7800	5.3410E 04	4.37915	39.2032	8.74361	112.4412	77.9033	5.2376E 04	6.7876E 04	5.3977E 05	7800
8000	5.6007E 04	4.37214	39.3070	8.73567	114.3453	78.1095	5.3603E 04	6.9505E 04	5.5537E 05	8000
8200	5.8651E 04	4.36465	39.4074	8.72728	116.2567	78.3089	5.4826E 04	7.1121E 04	5.7101E 05	8200
8400	6.1341E 04	4.35670	39.5045	8.71854	118.1748	78.5020	5.6031E 04	7.2723E 04	5.8669E 05	8400
8600	6.4074E 04	4.34832	39.5985	8.70948	120.0994	78.6888	5.7222E 04	7.4311E 04	6.0241E 05	8600
8800	6.6849E 04	4.33955	39.6896	8.70004	122.0301	78.8699	5.8399E 04	7.5886E 04	6.1817E 05	8800
9000	6.9663E 04	4.33042	39.7779	8.69026	123.9667	79.0453	5.9533E 04	7.7447E 04	6.3396E 05	9000
9200	7.2515E 04	4.32095	39.8635	8.68017	125.9094	79.2154	6.0713E 04	7.8995E 04	6.4979E 05	9200
9400	7.5404E 04	4.31118	39.9466	8.66970	127.8584	79.3804	6.1853E 04	8.0530E 04	6.6565E 05	9400
9600	7.8326E 04	4.30113	40.0272	8.65893	129.8136	79.5404	6.2951E 04	8.2052E 04	6.8156E 05	9600
9800	8.1281E 04	4.29083	40.1055	8.64789	131.7750	79.6962	6.4066E 04	8.3560E 04	6.9746E 05	9800

TABLE 91 (CONT.). IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIT. FUNCT.	$\frac{W}{RT}$	$-\frac{F^0 - F}{RT}$	\ln	$W^0 - F^0_{CAL}$	$-\ln \frac{F^0 - F}{W}$	$F^0 - F$	$W^0 - F^0_{CAL}$	$-\ln \frac{F^0 - F}{W}$	TEMP. (°K)
1000	8.4267E 04	4.20030	39.9012	40.1819	0.50566	71.3416	70.0473	0.51056	0.5057E 04	10000
1050	9.1853E 04	4.25314	36.1094	40.3625	0.45169	71.7553	69.2070	0.7870E 04	0.8742E 05	10500
1100	9.9594E 04	4.22507	34.3064	40.5317	0.39591	72.1672	66.5431	7.0440E 04	7.9562E 05	11000
1150	1.0744E 05	4.19430	34.4030	40.6902	0.33890	72.5192	63.8501	7.3045E 04	9.597E 04	11500
1200	1.1544E 05	4.16733	34.6718	40.8391	0.28117	72.8729	61.1540	7.5323E 04	9.9374E 04	12000
1250	1.2350E 05	4.14013	34.9413	40.9794	0.22315	73.2097	58.4339	7.7950E 04	1.0279E 05	12500
1300	1.3162E 05	4.10997	35.2030	41.1120	0.16519	73.5311	55.6943	8.0314E 04	1.0615E 05	13000
1350	1.3970E 05	4.07990	35.4575	41.2375	0.10759	73.8382	52.9456	8.2620E 04	1.0945E 05	13500
1400	1.4787E 05	4.05126	35.7054	41.3567	0.05037	74.1320	50.1826	8.4880E 04	1.1271E 05	14000
1450	1.5617E 05	4.02298	35.9471	41.4701	7.99432	74.4135	47.4078	8.7104E 04	1.1592E 05	14500
1500	1.6437E 05	3.99514	36.1830	41.5781	7.93099	74.6836	44.6236	8.9277E 04	1.1908E 05	15000
1550	1.7259E 05	3.96781	36.4135	41.6813	7.86449	74.9430	41.8277	9.1412E 04	1.2221E 05	15500
1600	1.8070E 05	3.94104	36.6391	41.7790	7.79540	75.1925	39.0240	9.3509E 04	1.2530E 05	16000
1650	1.8882E 05	3.91406	36.8606	41.8740	7.72440	75.4327	36.2122	9.5573E 04	1.2836E 05	16500
1700	1.9690E 05	3.88790	36.0764	41.9657	7.65060	75.6642	33.3929	9.7604E 04	1.3139E 05	17000
1750	2.0491E 05	3.86435	36.1000	42.0532	7.57411	75.8875	30.5664	9.9609E 04	1.3438E 05	17500
1800	2.1286E 05	3.84004	36.2073	42.1374	7.49570	76.1032	27.7359	1.0159E 05	1.3735E 05	18000
1850	2.2075E 05	3.81635	36.4022	42.2106	7.41371	76.3116	24.8953	1.0354E 05	1.4030E 05	18500
1900	2.2857E 05	3.79329	36.5937	42.2770	7.32709	76.5132	22.0411	1.0544E 05	1.4322E 05	19000
1950	2.3631E 05	3.77004	36.6019	42.3378	7.23729	76.7084	19.2017	1.0737E 05	1.4612E 05	19500
2000	2.4397E 05	3.74681	36.6071	42.4441	7.14491	76.8976	16.3475	1.0925E 05	1.4900E 05	20000
2050	2.5164E 05	3.72354	36.6094	42.5101	7.05000	77.0799	13.4879	1.1114E 05	1.5184E 05	20500
2100	2.5930E 05	3.69973	36.6073	42.5642	6.95332	77.2532	10.6277	1.1303E 05	1.5466E 05	21000
2150	2.6695E 05	3.67599	36.6016	43.1812	6.85470	77.4193	8.7643	1.1490E 05	1.5746E 05	21500
2200	2.7464E 05	3.65116	36.6010	43.3022	6.75479	77.5790	6.8990	1.1675E 05	1.6023E 05	22000
2250	2.8237E 05	3.62631	36.6031	43.3673	6.65331	77.7321	5.0344	1.1858E 05	1.6298E 05	22500
2300	2.9010E 05	3.60144	36.6078	43.4309	6.55046	77.8786	3.1694	1.2039E 05	1.6571E 05	23000
2350	2.9783E 05	3.57654	36.6147	43.4933	6.44624	78.0181	1.3044	1.2218E 05	1.6842E 05	23500
2400	3.0556E 05	3.55164	36.6236	43.5548	6.34069	78.1506	-0.5606	1.2395E 05	1.7111E 05	24000
2450	3.1329E 05	3.52674	36.6344	43.6155	6.23389	78.2761	-2.4156	1.2570E 05	1.7378E 05	24500
2500	3.2102E 05	3.50184	36.6471	43.6754	6.12594	78.3946	-4.2706	1.2743E 05	1.7643E 05	25000
2550	3.2875E 05	3.47694	36.6617	43.7346	6.01694	78.5061	-6.1256	1.2915E 05	1.7906E 05	25500
2600	3.3648E 05	3.45204	36.6782	43.7931	5.90694	78.6106	-7.9806	1.3086E 05	1.8168E 05	26000
2650	3.4421E 05	3.42714	36.6967	43.8511	5.79594	78.7081	-9.8356	1.3256E 05	1.8429E 05	26500
2700	3.5194E 05	3.40224	36.7172	43.9086	5.68494	78.8006	-11.6906	1.3425E 05	1.8689E 05	27000
2750	3.5967E 05	3.37734	36.7397	43.9657	5.57294	78.8881	-13.5456	1.3593E 05	1.8948E 05	27500
2800	3.6740E 05	3.35244	36.7637	44.0223	5.46094	78.9706	-15.4006	1.3760E 05	1.9206E 05	28000
2850	3.7513E 05	3.32754	36.7892	44.0784	5.34794	79.0481	-17.2556	1.3926E 05	1.9463E 05	28500
2900	3.8286E 05	3.30264	36.8162	44.1341	5.23494	79.1206	-19.1106	1.4091E 05	1.9719E 05	29000
2950	3.9059E 05	3.27774	36.8447	44.1894	5.12194	79.1881	-20.9656	1.4256E 05	2.0000E 05	29500
3000	3.9832E 05	3.25284	36.8742	44.2443	5.00894	79.2506	-22.8206	1.4420E 05	2.0280E 05	30000
3050	4.0605E 05	3.22794	36.9057	44.2988	4.89594	79.3081	-24.6756	1.4583E 05	2.0559E 05	30500
3100	4.1378E 05	3.20304	36.9382	44.3529	4.78294	79.3606	-26.5306	1.4746E 05	2.0838E 05	31000
3150	4.2151E 05	3.17814	36.9717	44.4066	4.66994	79.4081	-28.3856	1.4908E 05	2.1117E 05	31500
3200	4.2924E 05	3.15324	37.0062	44.4600	4.55694	79.4506	-30.2406	1.5069E 05	2.1396E 05	32000
3250	4.3697E 05	3.12834	37.0427	44.5131	4.44394	79.4881	-32.0956	1.5230E 05	2.1675E 05	32500
3300	4.4470E 05	3.10344	37.0802	44.5658	4.33094	79.5206	-33.9506	1.5391E 05	2.1954E 05	33000
3350	4.5243E 05	3.07854	37.1187	44.6183	4.21794	79.5531	-35.8056	1.5552E 05	2.2233E 05	33500
3400	4.6016E 05	3.05364	37.1582	44.6706	4.10494	79.5806	-37.6606	1.5713E 05	2.2512E 05	34000
3450	4.6789E 05	3.02874	37.1987	44.7226	3.99194	79.6081	-39.5156	1.5874E 05	2.2791E 05	34500
3500	4.7562E 05	3.00384	37.2402	44.7743	3.87894	79.6306	-41.3706	1.6035E 05	2.3070E 05	35000
3550	4.8335E 05	2.97894	37.2827	44.8258	3.76594	79.6531	-43.2256	1.6196E 05	2.3349E 05	35500
3600	4.9108E 05	2.95404	37.3262	44.8771	3.65294	79.6706	-45.0806	1.6357E 05	2.3628E 05	36000
3650	4.9881E 05	2.92914	37.3707	44.9281	3.53994	79.6881	-46.9356	1.6518E 05	2.3907E 05	36500
3700	5.0654E 05	2.90424	37.4162	44.9788	3.42694	79.6956	-48.7906	1.6679E 05	2.4186E 05	37000
3750	5.1427E 05	2.87934	37.4627	45.0293	3.31394	79.7031	-50.6456	1.6840E 05	2.4465E 05	37500
3800	5.2200E 05	2.85444	37.5102	45.0796	3.20094	79.7106	-52.5006	1.7001E 05	2.4744E 05	38000
3850	5.2973E 05	2.82954	37.5587	45.1297	3.08794	79.7181	-54.3556	1.7162E 05	2.5023E 05	38500
3900	5.3746E 05	2.80464	37.6082	45.1796	2.97494	79.7206	-56.2106	1.7323E 05	2.5302E 05	39000
3950	5.4519E 05	2.77974	37.6587	45.2293	2.86194	79.7231	-58.0656	1.7484E 05	2.5581E 05	39500
4000	5.5292E 05	2.75484	37.7102	45.2788	2.74894	79.7256	-60.0006	1.7645E 05	2.5860E 05	40000

TABLE 92. IDEAL GAS FUNCTIONS FOR O₂ (MOLECULAR WEIGHT 31.9988, R = 1.98717 CAL/MOLE, 7 STATES INCLUDED)

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E_0}{RT}$	$-\frac{F^0-E^0}{RT}$	$\frac{S^0}{R}$	$(h^2-E_0)T - (F^0-E^0)T_0 - \frac{S^0}{R}$	E^0-E_0	$-\frac{h^2-E_0}{CAL/MOLE}$	$-\frac{F^0-E^0}{CAL/MOLE}$	TEMP. (°K)
1000	5.1641E 02	3.77504	25.5079	29.2829	7.50164	50.4884	5.5149E 03	5.0688E 04	1000
1200	1.0374E 03	3.65341	26.2033	30.0567	7.61537	52.0702	6.8042E 03	6.2484E 04	1200
1400	1.2848E 03	3.52139	26.8025	30.7239	7.79246	53.2610	8.1776E 03	7.4565E 04	1400
1600	1.5595E 03	3.39088	27.3301	31.3110	7.91067	54.3094	9.4774E 03	8.6895E 04	1600
1800	1.8624E 03	4.03389	27.8021	31.8360	8.01601	55.2473	1.0852E 04	9.9443E 04	1800
2000	2.1947E 03	4.08208	28.2296	32.3117	8.11177	56.0969	1.2249E 04	1.1219E 05	2000
2200	2.5573E 03	4.12665	28.6208	32.7475	8.20034	56.8783	1.3604E 04	1.2512E 05	2200
2400	2.9514E 03	4.16843	28.9817	33.1501	8.28336	57.5914	1.5111E 04	1.3822E 05	2400
2600	3.3784E 03	4.20798	29.3169	33.5249	8.36195	58.2576	1.6574E 04	1.5147E 05	2600
2800	3.8396E 03	4.24564	29.6301	33.8758	8.43678	58.8860	1.8035E 04	1.6486E 05	2800
3000	4.3344E 03	4.28163	29.9283	34.2059	8.50831	59.4645	1.9563E 04	1.7839E 05	3000
3200	4.8702E 03	4.31612	30.2017	34.5179	8.57685	60.0159	2.1087E 04	1.9205E 05	3200
3400	5.4425E 03	4.34920	30.4664	34.8136	8.64259	60.5378	2.2682E 04	2.0583E 05	3400
3600	6.0547E 03	4.38095	30.7139	35.0949	8.70567	61.0336	2.4187E 04	2.1972E 05	3600
3800	6.7043E 03	4.41141	30.9516	35.3630	8.76621	61.5059	2.5760E 04	2.3372E 05	3800
4000	7.4049E 03	4.44065	31.1786	35.6193	8.82430	61.9571	2.7349E 04	2.4783E 05	4000
4200	8.1659E 03	4.46849	31.3960	35.8647	8.88003	62.3890	2.8950E 04	2.6203E 05	4200
4400	8.9827E 03	4.49589	31.6045	36.1001	8.93346	62.8033	3.0564E 04	2.7633E 05	4400
4600	9.7689E 03	4.52137	31.8049	36.3262	8.98470	63.2016	3.2196E 04	2.9073E 05	4600
4800	1.0630E 04	4.54605	31.9978	36.5439	9.03374	63.5850	3.3824E 04	3.0521E 05	4800
5000	1.1583E 04	4.56965	32.1839	36.7535	9.08065	63.9547	3.5467E 04	3.1977E 05	5000
5200	1.2568E 04	4.59218	32.3636	36.9537	9.12543	64.3117	3.7119E 04	3.3442E 05	5200
5400	1.3607E 04	4.61365	32.5373	37.1509	9.16808	64.6570	3.8777E 04	3.4915E 05	5400
5600	1.4699E 04	4.63404	32.7034	37.3395	9.20861	64.9911	4.0440E 04	3.6395E 05	5600
5800	1.5848E 04	4.65336	32.8684	37.5218	9.24699	65.3149	4.2107E 04	3.7883E 05	5800
6000	1.7053E 04	4.67157	33.0265	37.6980	9.28318	65.6290	4.3776E 04	3.9377E 05	6000
6200	1.8317E 04	4.68867	33.1799	37.8686	9.31716	65.9340	4.5444E 04	4.0879E 05	6200
6400	1.9640E 04	4.70463	33.3290	38.0337	9.34888	66.2303	4.7115E 04	4.2387E 05	6400
6600	2.1023E 04	4.71945	33.4740	38.1935	9.37833	66.5185	4.8782E 04	4.3902E 05	6600
6800	2.2468E 04	4.73311	33.6151	38.3482	9.40547	66.7988	5.0444E 04	4.5423E 05	6800
7000	2.3975E 04	4.74559	33.7525	38.4981	9.43028	67.0718	5.2102E 04	4.6950E 05	7000
7200	2.5545E 04	4.75690	33.8864	38.6433	9.45274	67.3378	5.3752E 04	4.8483E 05	7200
7400	2.7176E 04	4.76703	34.0168	38.7839	9.47287	67.5971	5.5394E 04	5.0022E 05	7400
7600	2.8875E 04	4.77598	34.1441	38.9201	9.49066	67.8500	5.7027E 04	5.1564E 05	7600
7800	3.0637E 04	4.78376	34.2683	39.0520	9.50613	68.0967	5.8648E 04	5.3115E 05	7800
8000	3.2464E 04	4.79040	34.3895	39.1799	9.51932	68.3375	6.0257E 04	5.4670E 05	8000
8200	3.4355E 04	4.79590	34.5078	39.3037	9.53025	68.5727	6.1835E 04	5.6230E 05	8200
8400	3.6311E 04	4.80030	34.6234	39.4237	9.53899	68.8025	6.3435E 04	5.7794E 05	8400
8600	3.8332E 04	4.80367	34.7364	39.5401	9.54598	69.0270	6.5032E 04	5.9363E 05	8600
8800	4.0418E 04	4.80589	34.8449	39.6528	9.55009	69.2445	6.6594E 04	6.0937E 05	8800
9000	4.2569E 04	4.80715	34.9549	39.7621	9.55259	69.4612	6.8099E 04	6.2515E 05	9000
9200	4.4783E 04	4.80743	35.0606	39.8680	9.55318	69.6712	6.9607E 04	6.4077E 05	9200
9400	4.7061E 04	4.80678	35.1640	39.9707	9.55186	69.8766	7.1108E 04	6.5624E 05	9400
9600	4.9402E 04	4.80523	35.2651	40.0704	9.54879	70.0777	7.2592E 04	6.7159E 05	9600
9800	5.1806E 04	4.80283	35.3642	40.1670	9.54402	70.2745	7.4057E 04	6.8669E 05	9800

TABLE 92 (CONT.). IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIAL- FUNCT.	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT} - \frac{F^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	$\frac{h^0 - E^0}{RT}$	TEMP. (°K)
10000	5.4271E 04	4.79963	35.4612	40.2408	9.33765	70.4673	80.0049	1.99028 04	9.5374E 04	7.0447E 05	10000
10500	6.0700E 04	4.77835	35.6551	40.4835	9.31523	70.3321	80.4473	1.99028 04	9.5374E 04	7.0447E 05	10500
11000	6.7495E 04	4.76295	35.9175	40.6905	9.29444	70.1961	80.8907	1.99028 04	9.5374E 04	7.0447E 05	11000
11500	7.4640E 04	4.75406	36.1293	40.8633	9.27410	70.0599	81.3341	1.99028 04	9.5374E 04	7.0447E 05	11500
12000	8.2118E 04	4.75227	36.3312	41.0634	9.25480	70.0000	81.7776	1.99028 04	9.5374E 04	7.0447E 05	12000
12500	8.9909E 04	4.70811	36.5239	41.2320	9.23579	72.3789	81.9347	1.99028 04	9.5374E 04	7.0447E 05	12500
13000	9.7994E 04	4.68205	36.7080	41.3901	9.21641	72.5449	82.2489	1.99028 04	9.5374E 04	7.0447E 05	13000
13500	1.0635E 05	4.65452	36.8842	41.5387	9.19690	72.7090	82.5443	1.99028 04	9.5374E 04	7.0447E 05	13500
14000	1.1496E 05	4.62587	37.0530	41.6788	9.17737	73.0304	82.8227	1.99028 04	9.5374E 04	7.0447E 05	14000
14500	1.2360E 05	4.59641	37.2146	41.8112	9.15783	73.3519	83.0857	1.99028 04	9.5374E 04	7.0447E 05	14500
15000	1.3289E 05	4.56640	37.3701	41.9345	9.13820	73.6735	83.3347	1.99028 04	9.5374E 04	7.0447E 05	15000
15500	1.4209E 05	4.53607	37.5193	42.0554	9.11857	74.0000	83.5710	1.99028 04	9.5374E 04	7.0447E 05	15500
16000	1.5151E 05	4.50559	37.6629	42.1685	9.09894	74.3214	83.7957	1.99028 04	9.5374E 04	7.0447E 05	16000
16500	1.6108E 05	4.47512	37.8010	42.2762	9.07921	74.6428	84.0097	1.99028 04	9.5374E 04	7.0447E 05	16500
17000	1.7079E 05	4.44479	37.9342	42.3790	9.05948	74.9642	84.2140	1.99028 04	9.5374E 04	7.0447E 05	17000
17500	1.8061E 05	4.41470	38.0626	42.4773	9.03975	75.2856	84.4094	1.99028 04	9.5374E 04	7.0447E 05	17500
18000	1.9054E 05	4.38493	38.1865	42.5715	9.01992	75.6070	84.5945	1.99028 04	9.5374E 04	7.0447E 05	18000
18500	2.0054E 05	4.35536	38.3063	42.6618	9.00009	75.9284	84.7761	1.99028 04	9.5374E 04	7.0447E 05	18500
19000	2.1065E 05	4.32602	38.4220	42.7487	8.98026	76.2498	84.9487	1.99028 04	9.5374E 04	7.0447E 05	19000
19500	2.2081E 05	4.29681	38.5341	42.8322	8.96043	76.5712	85.1147	1.99028 04	9.5374E 04	7.0447E 05	19500
20000	2.3101E 05	4.27023	38.6425	42.9128	8.94059	76.8926	85.2747	1.99028 04	9.5374E 04	7.0447E 05	20000
22000	2.7209E 05	4.16399	39.0445	43.2085	8.84505	77.5878	85.8624	1.99028 04	9.5374E 04	7.0447E 05	22000
24000	3.1131E 05	4.06683	39.4026	43.4494	8.74951	78.2994	86.3808	1.99028 04	9.5374E 04	7.0447E 05	24000
26000	3.5374E 05	3.97847	39.7245	43.7030	8.65397	79.0110	86.8451	1.99028 04	9.5374E 04	7.0447E 05	26000
28000	3.9352E 05	3.89825	40.0164	43.9146	8.55843	79.7226	87.2654	1.99028 04	9.5374E 04	7.0447E 05	28000
30000	4.3228E 05	3.82540	40.2828	44.1082	8.46289	80.4342	87.6503	1.99028 04	9.5374E 04	7.0447E 05	30000
32000	4.6988E 05	3.75914	40.5276	44.2867	8.36735	81.1458	88.0050	1.99028 04	9.5374E 04	7.0447E 05	32000
34000	5.0642E 05	3.69875	40.7536	44.4524	8.27181	81.8574	88.3342	1.99028 04	9.5374E 04	7.0447E 05	34000
36000	5.4127E 05	3.64335	40.9634	44.6070	8.17627	82.5699	88.6415	1.99028 04	9.5374E 04	7.0447E 05	36000
38000	5.7500E 05	3.59297	41.1591	44.7520	8.08073	83.2924	88.9297	1.99028 04	9.5374E 04	7.0447E 05	38000
40000	6.0743E 05	3.54648	41.3422	44.8887	7.98519	84.0149	89.2012	1.99028 04	9.5374E 04	7.0447E 05	40000

TABLE 93. IDEAL GAS FUNCTIONS FOR O₂. MOLECULAR WEIGHT 31.9983, R = 1.98717 CAL/MOLE, 4 STATES INCLUDED

TEMP. (°K)	PARTIT. FUNCT.	$\frac{H^0 - E_0^0}{RT}$	$\frac{S^0}{R}$	$\ln \frac{H^0 - E_0^0}{RT} - \frac{S^0}{R}$	$\frac{H^0 - E_0^0}{RT} - \frac{S^0}{R}$	$\frac{H^0 - E_0^0}{RT} - \frac{S^0}{R}$	$\frac{H^0 - E_0^0}{RT} - \frac{S^0}{R}$	$\frac{H^0 - E_0^0}{RT} - \frac{S^0}{R}$	$\frac{H^0 - E_0^0}{RT} - \frac{S^0}{R}$	TEMP. (°K)	
1000	9.0389E 02	3.70707	25.6097	29.3167	7.36656	50.8906	58.2572	5.3794E 03	7.3664E 03	5.0891E 04	1000
1200	1.1339E 03	3.78118	26.2922	30.0734	7.51382	52.2470	59.7608	6.6320E 03	9.0160E 03	6.2694E 04	1200
1400	1.3866E 03	3.84745	26.8802	30.7276	7.64552	53.4153	61.0608	7.9217E 03	1.0704E 04	7.4781E 04	1400
1600	1.6488E 03	3.90571	27.3978	31.3035	7.76129	54.4440	62.2053	9.2306E 03	1.2410E 04	8.7110E 04	1600
1800	1.9752E 03	3.95677	27.8660	31.8176	7.86275	55.3641	63.2268	1.0576E 04	1.4153E 04	9.9455E 04	1800
2000	2.3083E 03	4.00163	28.2801	32.2817	7.95190	56.1972	64.1491	1.1929E 04	1.5904E 04	1.1239E 05	2000
2200	2.6385E 03	4.04127	28.6634	32.7047	8.03048	56.9586	64.9896	1.3296E 04	1.7667E 04	1.2531E 05	2200
2400	3.0562E 03	4.07654	29.0166	33.0931	8.10767	57.6607	65.7615	1.4673E 04	1.9442E 04	1.3839E 05	2400
2600	3.4717E 03	4.10813	29.3441	33.4523	8.16353	58.3116	66.4752	1.6059E 04	2.1223E 04	1.5161E 05	2600
2800	3.9153E 03	4.13664	29.6496	33.7863	8.22018	58.9187	67.1369	1.7452E 04	2.3017E 04	1.6497E 05	2800
3000	4.3872E 03	4.16255	29.9359	34.0985	8.27167	59.4877	67.7593	1.8854E 04	2.4815E 04	1.7844E 05	3000
3200	4.8879E 03	4.18624	30.2053	34.3916	8.31874	60.0230	68.3418	2.0261E 04	2.6620E 04	1.9207E 05	3200
3400	5.4176E 03	4.20807	30.4598	34.6539	8.36212	60.5287	68.8908	2.1675E 04	2.8431E 04	2.0580E 05	3400
3600	5.9768E 03	4.22831	30.7009	34.9292	8.40236	61.0078	69.4101	2.3095E 04	3.0248E 04	2.1963E 05	3600
3800	6.5654E 03	4.24724	30.9300	35.1773	8.43946	61.4631	69.9031	2.4521E 04	3.2072E 04	2.3334E 05	3800
4000	7.1843E 03	4.26505	31.1483	35.4134	8.47337	61.8969	70.3723	2.5953E 04	3.3901E 04	2.4759E 05	4000
4200	7.8336E 03	4.28198	31.3569	35.6388	8.50900	62.3112	70.8202	2.7392E 04	3.5738E 04	2.6171E 05	4200
4400	8.5139E 03	4.29820	31.5564	35.8546	8.54123	62.7078	71.2491	2.8838E 04	3.7581E 04	2.7591E 05	4400
4600	9.2256E 03	4.31388	31.7478	36.0617	8.57240	63.0882	71.6606	3.0292E 04	3.9433E 04	2.9021E 05	4600
4800	9.9692E 03	4.32920	31.9318	36.2610	8.60284	63.4537	72.0565	3.1759E 04	4.1294E 04	3.0458E 05	4800
5000	1.0745E 04	4.34430	32.1088	36.4531	8.63285	63.8055	72.4383	3.3228E 04	4.3164E 04	3.1903E 05	5000
5200	1.1555E 04	4.35933	32.2795	36.6388	8.66271	64.1446	72.8074	3.4713E 04	4.5044E 04	3.3355E 05	5200
5400	1.2398E 04	4.37442	32.4443	36.8187	8.69270	64.4721	73.1648	3.6210E 04	4.6941E 04	3.4815E 05	5400
5600	1.3277E 04	4.38968	32.6036	36.9933	8.72303	64.7888	73.5118	3.7721E 04	4.8849E 04	3.6282E 05	5600
5800	1.4191E 04	4.40522	32.7579	37.1632	8.75390	65.0955	73.8494	3.9247E 04	5.0773E 04	3.7755E 05	5800
6000	1.5142E 04	4.42111	32.9076	37.3287	8.78547	65.3928	74.1782	4.0790E 04	5.2713E 04	3.9236E 05	6000
6200	1.6130E 04	4.43741	33.0528	37.4902	8.81786	65.6814	74.4992	4.2350E 04	5.4688E 04	4.0722E 05	6200
6400	1.7158E 04	4.45417	33.1919	37.6481	8.85118	65.9618	74.8130	4.3930E 04	5.6648E 04	4.2216E 05	6400
6600	1.8226E 04	4.47142	33.3313	37.8037	8.88545	66.2347	75.1202	4.5529E 04	5.8644E 04	4.3715E 05	6600
6800	1.9336E 04	4.48916	33.4650	37.9562	8.92070	66.5005	75.4212	4.7148E 04	6.0661E 04	4.5220E 05	6800
7000	2.0490E 04	4.50737	33.5954	38.1028	8.95690	66.7596	75.7165	4.8798E 04	6.2698E 04	4.6732E 05	7000
7200	2.1687E 04	4.52605	33.7226	38.2487	8.99401	67.0125	76.0065	5.0449E 04	6.4757E 04	4.8249E 05	7200
7400	2.2931E 04	4.54513	33.8469	38.3920	9.03193	67.2594	76.2913	5.2131E 04	6.6834E 04	4.9772E 05	7400
7600	2.4223E 04	4.56458	33.9684	38.5330	9.07077	67.5008	76.5714	5.3834E 04	6.8934E 04	5.1301E 05	7600
7800	2.5564E 04	4.58451	34.0872	38.6713	9.10979	67.7369	76.8467	5.5558E 04	7.1054E 04	5.2835E 05	7800
8000	2.6956E 04	4.60427	34.2035	38.8078	9.14944	67.9680	77.1175	5.7298E 04	7.3195E 04	5.4374E 05	8000
8200	2.8401E 04	4.62436	34.3175	38.9418	9.18936	68.1945	77.3838	5.9058E 04	7.5353E 04	5.5919E 05	8200
8400	2.9900E 04	4.64469	34.4291	39.0736	9.22938	68.4164	77.6458	6.0833E 04	7.7521E 04	5.7470E 05	8400
8600	3.1454E 04	4.66459	34.5387	39.2032	9.26931	68.6340	77.9033	6.2628E 04	7.9719E 04	5.9025E 05	8600
8800	3.3067E 04	4.68456	34.6461	39.3307	9.30899	68.8476	78.1566	6.4432E 04	8.1919E 04	6.0586E 05	8800
9000	3.4739E 04	4.70431	34.7516	39.4559	9.34823	69.0572	78.4055	6.6250E 04	8.4134E 04	6.2151E 05	9000
9200	3.6471E 04	4.72375	34.8552	39.5790	9.38687	69.2631	78.6500	6.8077E 04	8.6359E 04	6.3722E 05	9200
9400	3.8265E 04	4.74280	34.9570	39.6998	9.42473	69.4654	78.8901	6.9913E 04	8.8592E 04	6.5297E 05	9400
9600	4.0123E 04	4.76139	35.0571	39.8185	9.46167	69.6642	79.1259	7.1755E 04	9.0832E 04	6.6870E 05	9600
9800	4.2046E 04	4.77944	35.1554	39.9349	9.49753	69.8597	79.3572	7.3602E 04	9.3074E 04	6.8442E 05	9800

TABLE 93 (CONT.) IDEAL GAS FUNCTIONS FOR O₂

TEMP. (°K)	PARTIT. FUNC.	$\frac{h^2}{RT}$	$\ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	$\ln \frac{h^2}{RT} - \ln \frac{h^2}{RT}$	TEMP. (°K)
10000	4.4034E 04	4.79688	35.2522	40.0490	9.53218	70.0519	79.5841	7.5450E 04	10000
10500	4.9307E 04	4.83744	35.4872	40.3247	9.61280	70.5190	80.1318	8.0049E 04	10500
11000	5.5017E 04	4.87312	35.7131	40.5862	9.68370	70.9678	80.5515	8.4662E 04	11000
11500	6.1180E 04	4.90344	35.9304	40.8338	9.74394	71.4097	81.1436	8.9203E 04	11500
12000	6.7806E 04	4.92817	36.1396	41.0678	9.79310	71.8154	81.6085	9.3671E 04	12000
12500	7.4902E 04	4.94732	36.3412	41.2885	9.83114	72.2160	82.0472	9.8050E 04	12500
13000	8.2472E 04	4.96103	36.5355	41.4766	9.85830	72.6022	82.4605	1.0233E 05	13000
13500	9.0515E 04	4.96957	36.7229	41.6925	9.87336	72.9746	82.8499	1.0449E 05	13500
14000	9.9028E 04	4.97332	36.9038	41.8771	9.88281	73.3339	83.2167	1.1054E 05	14000
14500	1.0801E 05	4.97267	37.0783	42.0510	9.88153	73.6807	83.5622	1.1447E 05	14500
15000	1.1744E 05	4.96807	37.2468	42.2149	9.87237	74.0155	83.8879	1.1828E 05	15000
15500	1.2733E 05	4.95994	37.4096	42.3695	9.85622	74.3390	84.1952	1.2197E 05	15500
16000	1.3765E 05	4.94870	37.5669	42.5156	9.83389	74.6516	84.4855	1.2555E 05	16000
16500	1.4839E 05	4.93476	37.7189	42.6537	9.80619	74.9538	84.7600	1.2901E 05	16500
17000	1.5954E 05	4.91849	37.8660	42.7845	9.77386	75.2460	85.0199	1.3237E 05	17000
17500	1.7108E 05	4.90024	38.0083	42.9086	9.73758	75.5289	85.2664	1.3563E 05	17500
18000	1.8300E 05	4.88031	38.1461	43.0264	9.69798	75.8026	85.5004	1.3879E 05	18000
18500	1.9527E 05	4.85898	38.2793	43.1385	9.65559	76.0678	85.7234	1.4187E 05	18500
19000	2.0789E 05	4.83650	38.4088	43.2453	9.61092	76.3257	85.9356	1.4485E 05	19000
19500	2.2083E 05	4.81309	38.5341	43.3472	9.56441	76.5757	86.1381	1.4776E 05	19500
20000	2.3408E 05	4.78895	38.6557	43.4446	9.51643	76.8153	86.3317	1.5059E 05	20000
22000	2.8978E 05	4.68811	39.1074	43.7956	9.31605	77.7130	87.0290	1.6124E 05	22000
24000	3.4902E 05	4.58566	39.5110	44.0966	9.11247	78.5148	87.6273	1.7101E 05	24000
26000	4.1079E 05	4.48591	39.8740	44.3600	8.91424	79.2363	88.1506	1.8010E 05	26000
28000	4.7424E 05	4.39099	40.2030	44.5940	8.72563	79.8900	88.6156	1.8868E 05	28000
30000	5.3869E 05	4.30186	40.5029	44.8047	8.54851	80.4859	89.0344	1.9684E 05	30000
32000	6.0351E 05	4.21876	40.7778	44.9966	8.38338	81.0322	89.4156	2.0468E 05	32000
34000	6.6822E 05	4.14158	41.0312	45.1728	8.23001	81.5358	89.7458	2.1226E 05	34000
36000	7.3249E 05	4.07002	41.2659	45.3359	8.08780	82.0022	90.0900	2.1962E 05	36000
38000	7.9590E 05	4.00369	41.4842	45.4878	7.95599	82.4359	90.3919	2.2682E 05	38000
40000	8.5836E 05	3.94217	41.6879	45.6301	7.83375	82.8408	90.6746	2.3386E 05	40000

TABLE 9A. IDEAL GAS FUNCTIONS FOR CO (MOLECULAR WEIGHT 28.0106, R = 1.98717 CAL/MOLE, 7 STATES INCLUDED)

TEMP. (°K)	PARTIT. FUNCT.	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	$\frac{h^2-E_0}{RT}$	TEMP. (°K)
1000	3.8033E 02	3.6131	24.5443	28.1556	7.55576	48.7735	56.0293	5.2688E 03	7.2558E 03	7.2558E 03	4.8774E 04	1600
1200	4.7192E 02	3.71824	25.2159	28.9342	7.38876	50.1082	57.4970	6.4819E 03	8.8665E 03	8.8665E 03	6.0130E 04	1200
1400	5.7214E 02	3.74087	25.7939	29.5747	7.51321	51.2567	58.7699	7.7365E 03	1.0510E 04	1.0510E 04	7.1759E 04	1400
1600	6.8143E 02	3.83758	26.3025	30.1401	7.62590	52.2674	60.0933	9.0220E 03	1.2201E 04	1.2201E 04	8.3628E 04	1600
1800	8.0008E 02	3.84824	26.7575	30.6457	7.72661	53.1716	60.4982	1.0331E 04	1.3908E 04	1.3908E 04	9.5709E 04	1800
2000	9.2831E 02	3.93339	27.1695	31.1029	7.81629	53.9904	61.8067	1.1658E 04	1.5633E 04	1.5633E 04	1.0798E 05	2000
2200	1.0654E 03	3.97360	27.5464	31.5200	7.89621	54.7392	63.0534	1.3000E 04	1.7372E 04	1.7372E 04	1.2043E 05	2200
2400	1.2140E 03	4.03936	27.8937	31.9032	7.96766	55.4293	63.9700	1.4353E 04	1.9122E 04	1.9122E 04	1.3303E 05	2400
2600	1.3711E 03	4.06185	28.2159	32.2578	8.03182	56.0697	64.1015	1.5716E 04	2.0883E 04	2.0883E 04	1.4578E 05	2600
2800	1.5394E 03	4.07097	28.5165	32.5875	8.08969	56.6670	64.7567	1.7087E 04	2.2651E 04	2.2651E 04	1.5867E 05	2800
3000	1.7173E 03	4.09738	28.7983	32.8957	8.14218	57.2270	65.3492	1.8465E 04	2.4427E 04	2.4427E 04	1.7146E 05	3000
3200	1.9052E 03	4.12145	29.0635	33.1850	8.19000	57.7540	65.9440	1.9849E 04	2.6208E 04	2.6208E 04	1.8481E 05	3200
3400	2.1034E 03	4.14350	29.3141	33.4575	8.23381	58.2519	66.4957	2.1239E 04	2.7993E 04	2.7993E 04	1.9806E 05	3400
3600	2.3138E 03	4.16375	29.5515	33.7152	8.27406	58.7237	66.9977	2.2633E 04	2.9787E 04	2.9787E 04	2.1141E 05	3600
3800	2.5308E 03	4.18247	29.7771	33.9596	8.31126	59.1720	67.4833	2.4032E 04	3.1580E 04	3.1580E 04	2.2485E 05	3800
4000	2.7601E 03	4.19984	29.9921	34.1919	8.34577	59.5992	67.9450	2.5434E 04	3.3380E 04	3.3380E 04	2.3840E 05	4000
4200	3.0000E 03	4.21601	30.1974	34.4134	8.37791	60.0072	68.3851	2.6841E 04	3.5187E 04	3.5187E 04	2.5203E 05	4200
4400	3.2505E 03	4.23112	30.3939	34.6250	8.40793	60.3976	68.8056	2.8251E 04	3.6995E 04	3.6995E 04	2.6575E 05	4400
4600	3.5115E 03	4.24531	30.5823	34.8276	8.43613	60.7720	69.2081	2.9665E 04	3.8806E 04	3.8806E 04	2.7955E 05	4600
4800	3.7834E 03	4.25868	30.7632	35.0219	8.46270	61.1316	69.5943	3.1083E 04	4.0621E 04	4.0621E 04	2.9343E 05	4800
5000	4.0661E 03	4.27133	30.9373	35.2087	8.48783	61.4776	69.9654	3.2503E 04	4.2439E 04	4.2439E 04	3.0739E 05	5000
5200	4.3595E 03	4.28335	31.1051	35.3884	8.51173	61.8110	70.3227	3.3928E 04	4.4261E 04	4.4261E 04	3.2142E 05	5200
5400	4.6641E 03	4.29481	31.2670	35.5618	8.53450	62.1326	70.6671	3.5356E 04	4.6084E 04	4.6084E 04	3.3552E 05	5400
5600	4.9797E 03	4.30579	31.4234	35.7291	8.55631	62.4434	70.9997	3.6787E 04	4.7915E 04	4.7915E 04	3.4968E 05	5600
5800	5.3063E 03	4.31637	31.5746	35.8910	8.57735	62.7440	71.3214	3.8223E 04	4.9749E 04	4.9749E 04	3.6392E 05	5800
6000	5.6443E 03	4.32664	31.7211	36.0478	8.59774	63.0352	71.6329	3.9643E 04	5.1586E 04	5.1586E 04	3.7821E 05	6000
6200	5.9934E 03	4.33665	31.8632	36.1998	8.61764	63.3174	71.9350	4.1109E 04	5.3429E 04	5.3429E 04	3.9257E 05	6200
6400	6.3548E 03	4.34649	32.0010	36.3475	8.63720	63.5913	72.2285	4.2560E 04	5.5278E 04	5.5278E 04	4.0698E 05	6400
6600	6.7273E 03	4.35624	32.1349	36.4912	8.65637	63.8574	72.5140	4.4018E 04	5.7133E 04	5.7133E 04	4.2148E 05	6600
6800	7.1117E 03	4.36598	32.2651	36.6311	8.67592	64.1161	72.7920	4.5484E 04	5.8996E 04	5.8996E 04	4.3599E 05	6800
7000	7.5080E 03	4.37577	32.3928	36.7676	8.69539	64.3679	73.0633	4.6958E 04	6.0866E 04	6.0866E 04	4.5058E 05	7000
7200	7.9164E 03	4.38577	32.5152	36.9009	8.71516	64.6131	73.3283	4.8442E 04	6.2749E 04	6.2749E 04	4.6521E 05	7200
7400	8.3374E 03	4.39592	32.6355	37.0314	8.73543	64.8522	73.5876	4.9937E 04	6.4642E 04	6.4642E 04	4.7991E 05	7400
7600	8.7710E 03	4.40644	32.7529	37.1593	8.75633	65.0854	73.8417	5.1446E 04	6.6548E 04	6.6548E 04	4.9465E 05	7600
7800	9.2176E 03	4.41738	32.8675	37.2849	8.77806	65.3131	74.0912	5.2969E 04	6.8469E 04	6.8469E 04	5.0944E 05	7800
8000	9.6775E 03	4.42882	32.9795	37.4083	8.80079	65.5357	74.3364	5.4509E 04	7.0404E 04	7.0404E 04	5.2429E 05	8000
8200	1.0151E 04	4.44086	33.0890	37.5298	8.82469	65.7533	74.5779	5.6048E 04	7.2362E 04	7.2362E 04	5.3916E 05	8200
8400	1.0639E 04	4.45354	33.1961	37.6497	8.84922	65.9662	74.8161	5.7597E 04	7.4339E 04	7.4339E 04	5.5412E 05	8400
8600	1.1141E 04	4.46700	33.3011	37.7681	8.87446	66.1744	75.0514	5.9250E 04	7.6339E 04	7.6339E 04	5.6910E 05	8600
8800	1.1658E 04	4.48126	33.4039	37.8857	8.90005	66.3792	75.2842	6.0877E 04	7.8364E 04	7.8364E 04	5.8414E 05	8800
9000	1.2191E 04	4.49647	33.5048	38.0013	8.92522	66.5796	75.5148	6.2533E 04	8.0417E 04	8.0417E 04	5.9928E 05	9000
9200	1.2740E 04	4.51263	33.6038	38.1165	8.96734	66.7764	75.7437	6.4218E 04	8.2499E 04	8.2499E 04	6.1458E 05	9200
9400	1.3308E 04	4.52981	33.7011	38.2309	9.00169	66.9696	75.9711	6.5935E 04	8.4614E 04	8.4614E 04	6.2951E 05	9400
9600	1.3890E 04	4.54807	33.7966	38.3447	9.03777	67.1595	76.1972	6.7686E 04	8.6763E 04	8.6763E 04	6.4473E 05	9600
9800	1.4492E 04	4.56745	33.8906	38.4580	9.07627	67.3462	76.4225	6.9473E 04	8.8947E 04	8.8947E 04	6.5999E 05	9800

TABLE 94 (CONT.). IDEAL GAS FUNCTIONS FOR CO

[illegible]

TABLE 95. FRACTIONAL ELECTRONIC POPULATIONS OF N2

TEMP. (°K)	$X^{1\Sigma^+}_g$	$A^{2\Sigma^+}_u$	STATE $^2\Delta_u$	$B^3\Pi_g$	$B'^3\Sigma^-_u$	$a'^1\Sigma^-_u$	$a^1\Pi_g$	$w^1\Delta_u$
1200	1.03E-00	5.86E-26	5.90E-30	1.03E-30	2.36E-34	8.10E-34	3.31E-34	1.05E-37
1400	1.00E-00	1.87E-19	2.22E-22	5.85E-23	9.33E-26	5.95E-27	3.32E-27	3.14E-28
2000	1.00E-00	1.51E-15	7.87E-18	2.90E-18	1.38E-20	1.15E-21	8.33E-22	1.30E-22
2400	1.00E-00	6.10E-13	6.54E-15	3.14E-15	3.77E-17	4.01E-18	3.33E-18	7.28E-19
2800	1.00E-00	4.46E-11	1.24E-12	5.15E-13	1.09E-14	1.36E-15	1.25E-15	3.47E-16
3200	1.00E-00	1.12E-09	5.37E-11	2.36E-11	7.64E-13	1.00E-13	1.04E-13	3.54E-14
3400	1.00E-00	1.37E-08	9.93E-10	4.44E-10	2.09E-11	3.24E-12	3.39E-12	1.30E-12
4000	1.00E-00	1.07E-07	1.03E-08	5.03E-09	2.98E-10	4.94E-11	5.40E-11	2.31E-11
4400	1.00E-00	5.10E-07	6.95E-08	3.54E-08	2.59E-09	4.59E-10	5.21E-10	2.44E-10
4800	1.00E-00	2.09E-06	3.42E-07	1.80E-07	1.58E-08	2.95E-09	3.45E-09	1.75E-09
5200	1.00E-00	4.67E-06	1.32E-06	7.13E-07	7.30E-08	1.42E-08	1.71E-08	9.23E-09
5600	1.00E-00	1.81E-05	4.21E-06	2.32E-06	2.71E-07	5.48E-08	6.73E-08	3.85E-08
6000	1.00E-00	4.28E-05	1.15E-05	6.44E-06	8.45E-07	1.77E-07	2.21E-07	1.33E-07
6400	1.00E-00	9.10E-05	2.76E-05	1.58E-05	2.30E-06	4.92E-07	6.27E-07	3.93E-07
6800	1.00E-00	1.77E-04	6.00E-05	3.49E-05	5.55E-06	1.22E-06	1.57E-06	1.02E-06
7200	9.99E-01	3.19E-04	1.20E-04	7.05E-05	1.21E-05	2.72E-06	3.56E-06	2.40E-06
7600	9.99E-01	5.41E-04	2.22E-04	1.32E-04	2.44E-05	5.59E-06	7.41E-06	5.14E-06
8000	9.99E-01	8.67E-04	3.86E-04	2.33E-04	4.59E-05	1.07E-05	1.43E-05	1.02E-05
8400	9.99E-01	1.33E-03	6.37E-04	3.87E-04	8.12E-05	1.92E-05	2.60E-05	1.90E-05
8800	9.94E-01	1.95E-03	1.00E-03	6.16E-04	1.36E-04	3.27E-05	4.47E-05	3.34E-05
9200	9.94E-01	2.77E-03	1.52E-03	9.38E-04	2.19E-04	5.31E-05	7.33E-05	5.58E-05
9600	9.92E-01	3.80E-03	2.22E-03	1.38E-03	3.34E-04	8.28E-05	1.15E-04	8.94E-05
10000	9.89E-01	5.08E-03	3.13E-03	1.96E-03	5.00E-04	1.25E-04	1.75E-04	1.30E-04
11000	9.77E-01	9.45E-03	6.61E-03	4.19E-03	1.12E-03	3.02E-04	4.30E-04	3.51E-04
12000	9.60E-01	1.56E-02	1.22E-02	7.79E-03	2.37E-03	6.23E-04	9.01E-04	7.58E-04
13000	9.39E-01	2.33E-02	2.00E-02	1.29E-02	4.23E-03	1.14E-03	1.66E-03	1.43E-03
14000	9.04E-01	3.23E-02	3.02E-02	1.96E-02	6.83E-03	1.88E-03	2.37E-03	2.44E-03
15000	8.67E-01	4.17E-02	4.23E-02	2.77E-02	1.02E-02	2.85E-03	4.24E-03	3.80E-03
16000	8.26E-01	5.17E-02	5.59E-02	3.68E-02	1.42E-02	4.05E-03	6.07E-03	5.52E-03
17000	7.82E-01	6.12E-02	7.04E-02	4.65E-02	1.87E-02	5.65E-03	8.24E-03	7.59E-03
18000	7.37E-01	7.00E-02	8.52E-02	5.64E-02	2.36E-02	6.97E-03	1.04E-02	9.89E-03
19000	6.93E-01	7.79E-02	9.97E-02	6.62E-02	2.87E-02	8.61E-03	1.32E-02	1.23E-02
20000	6.51E-01	8.47E-02	1.14E-01	7.56E-02	3.39E-02	1.03E-02	1.59E-02	1.50E-02
24000	5.08E-01	1.02E-01	1.60E-01	1.07E-01	5.32E-02	1.70E-02	2.47E-02	2.57E-02
28000	4.07E-01	1.09E-01	1.91E-01	1.29E-01	6.88E-02	2.30E-02	3.44E-02	3.55E-02
32000	3.39E-01	1.10E-01	2.11E-01	1.42E-01	8.08E-02	2.78E-02	4.45E-02	4.39E-02
36000	2.92E-01	1.09E-01	2.24E-01	1.51E-01	8.99E-02	3.18E-02	5.12E-02	5.07E-02
40000	2.57E-01	1.07E-01	2.33E-01	1.57E-01	9.69E-02	3.51E-02	5.61E-02	5.65E-02

TABLE 96. FRACTIONAL ELECTRONIC POPULATIONS OF N2+

TEMP. (°K)	X ² _g ⁺	A	² E _u	B	² Σ _u ⁺	STATE	A _u	D	² Π _g	f _u	C ² _u ⁺
1200	1.00E-00	1.44E-04	4.43E-14	2.14E-23	9.91E-31	1.10E-26	1.10E-31	1.10E-12	1.10E-12	1.10E-12	1.10E-12
1400	9.98E-01	1.44E-03	9.32E-11	1.30E-17	4.95E-20	5.08E-20	5.08E-20	5.08E-12	5.08E-12	5.08E-12	5.08E-12
2000	9.93E-01	7.08E-03	9.13E-09	3.88E-14	3.19E-16	6.18E-16	6.18E-16	6.18E-12	6.18E-12	6.18E-12	6.18E-12
2400	9.81E-01	1.96E-02	1.92E-07	7.92E-12	2.48E-13	3.22E-13	3.22E-13	3.22E-12	3.22E-12	3.22E-12	3.22E-12
2800	9.63E-01	3.58E-02	1.84E-06	3.52E-10	2.01E-11	2.52E-11	2.52E-11	2.52E-12	2.52E-12	2.52E-12	2.52E-12
3200	9.39E-01	6.08E-02	8.43E-06	5.99E-09	5.39E-10	6.92E-10	6.92E-10	6.92E-12	6.92E-12	6.92E-12	6.92E-12
3400	9.11E-01	8.89E-02	2.93E-05	5.37E-08	6.89E-09	9.03E-09	9.03E-09	9.03E-12	9.03E-12	9.03E-12	9.03E-12
4000	8.81E-01	1.19E-01	7.85E-05	3.07E-07	5.24E-08	6.99E-08	6.99E-08	6.99E-11	6.99E-11	6.99E-11	6.99E-11
4400	8.49E-01	1.51E-01	1.75E-04	1.27E-06	2.73E-07	3.70E-07	3.70E-07	3.70E-10	3.70E-10	3.70E-10	3.70E-10
4800	8.18E-01	1.82E-01	3.38E-04	4.09E-06	1.08E-06	1.47E-06	1.47E-06	1.47E-09	1.47E-09	1.47E-09	1.47E-09
5200	7.88E-01	2.11E-01	5.47E-04	1.10E-05	3.41E-06	4.68E-06	4.68E-06	4.68E-07	4.68E-07	4.68E-07	4.68E-07
5400	7.59E-01	2.40E-01	9.40E-04	2.51E-05	9.11E-05	1.26E-05	1.26E-05	1.26E-08	1.26E-08	1.26E-08	1.26E-08
6000	7.32E-01	2.67E-01	1.41E-03	5.13E-05	2.13E-05	2.93E-05	2.93E-05	2.93E-07	2.93E-07	2.93E-07	2.93E-07
6400	7.06E-01	2.91E-01	2.00E-03	9.68E-05	4.45E-05	6.11E-05	6.11E-05	6.11E-07	6.11E-07	6.11E-07	6.11E-07
6800	6.83E-01	3.14E-01	2.72E-03	1.67E-04	8.50E-05	1.16E-04	1.16E-04	1.16E-06	1.16E-06	1.16E-06	1.16E-06
7200	6.61E-01	3.35E-01	3.58E-03	2.69E-04	1.51E-04	2.04E-04	2.04E-04	2.04E-06	2.04E-06	2.04E-06	2.04E-06
7600	6.40E-01	3.52E-01	4.56E-03	4.12E-04	2.51E-04	3.36E-04	3.36E-04	3.36E-06	3.36E-06	3.36E-06	3.36E-06
8000	6.21E-01	3.72E-01	5.67E-03	6.06E-04	3.98E-04	5.23E-04	5.23E-04	5.23E-06	5.23E-06	5.23E-06	5.23E-06
8400	6.03E-01	3.88E-01	6.89E-03	8.41E-04	5.94E-04	7.78E-04	7.78E-04	7.78E-06	7.78E-06	7.78E-06	7.78E-06
8800	5.86E-01	4.03E-01	8.22E-03	1.14E-03	8.62E-04	1.11E-03	1.11E-03	1.11E-06	1.11E-06	1.11E-06	1.11E-06
9200	5.70E-01	4.16E-01	9.64E-03	1.49E-03	1.21E-03	1.53E-03	1.53E-03	1.53E-06	1.53E-06	1.53E-06	1.53E-06
9600	5.55E-01	4.28E-01	1.12E-02	1.91E-03	1.63E-03	2.04E-03	2.04E-03	2.04E-06	2.04E-06	2.04E-06	2.04E-06
10000	5.41E-01	4.38E-01	1.28E-02	2.38E-03	2.14E-03	2.65E-03	2.65E-03	2.65E-06	2.65E-06	2.65E-06	2.65E-06
11000	5.09E-01	4.80E-01	1.70E-02	3.82E-03	3.91E-03	4.61E-03	4.61E-03	4.61E-06	4.61E-06	4.61E-06	4.61E-06
12000	4.82E-01	4.77E-01	2.14E-02	5.56E-03	6.33E-03	7.16E-03	7.16E-03	7.16E-06	7.16E-06	7.16E-06	7.16E-06
13000	4.57E-01	4.88E-01	2.58E-02	7.51E-03	9.40E-03	1.02E-02	1.02E-02	1.02E-06	1.02E-06	1.02E-06	1.02E-06
14000	4.35E-01	4.95E-01	3.01E-02	9.60E-03	1.31E-02	1.37E-02	1.37E-02	1.37E-06	1.37E-06	1.37E-06	1.37E-06
15000	4.15E-01	5.00E-01	3.42E-02	1.17E-02	1.72E-02	1.73E-02	1.73E-02	1.73E-06	1.73E-06	1.73E-06	1.73E-06
16000	3.98E-01	5.02E-01	3.80E-02	1.38E-02	2.17E-02	2.11E-02	2.11E-02	2.11E-06	2.11E-06	2.11E-06	2.11E-06
17000	3.82E-01	5.02E-01	4.19E-02	1.59E-02	2.64E-02	2.49E-02	2.49E-02	2.49E-06	2.49E-06	2.49E-06	2.49E-06
18000	3.68E-01	5.01E-01	4.44E-02	1.78E-02	3.12E-02	2.87E-02	2.87E-02	2.87E-06	2.87E-06	2.87E-06	2.87E-06
19000	3.55E-01	4.98E-01	4.74E-02	1.96E-02	3.62E-02	3.22E-02	3.22E-02	3.22E-06	3.22E-06	3.22E-06	3.22E-06
20000	3.44E-01	4.96E-01	4.99E-02	2.13E-02	4.11E-02	3.57E-02	3.57E-02	3.57E-06	3.57E-06	3.57E-06	3.57E-06
24000	3.08E-01	4.81E-01	5.76E-02	2.68E-02	5.98E-02	5.05E-02	5.05E-02	5.05E-06	5.05E-06	5.05E-06	5.05E-06
28000	2.83E-01	4.65E-01	6.24E-02	3.06E-02	7.60E-02	6.83E-02	6.83E-02	6.83E-06	6.83E-06	6.83E-06	6.83E-06
32000	2.65E-01	4.51E-01	6.54E-02	3.32E-02	8.97E-02	8.29E-02	8.29E-02	8.29E-06	8.29E-06	8.29E-06	8.29E-06
36000	2.52E-01	4.39E-01	6.74E-02	3.51E-02	1.01E-01	9.78E-02	9.78E-02	9.78E-06	9.78E-06	9.78E-06	9.78E-06
40000	2.41E-01	4.29E-01	6.88E-02	3.65E-02	1.11E-01	1.16E-02	1.16E-02	1.16E-06	1.16E-06	1.16E-06	1.16E-06

TABLE 97. FRACTIONAL ELECTRONIC POPULATIONS OF NO

TEMP. (°K)	STATE						
	X ² _Π	a ⁴ _Π	A ² _{Σ⁺}	B ² _Π	b ⁴ _{Σ⁻}	C ² _Π	D ² _{Σ⁺}
1200	1.00E 00	6.98E-20	4.22E-24	4.22E-24	4.69E-25	4.63E-28	7.80E-29
1600	1.00E 00	6.50E-15	2.28E-18	3.74E-18	6.89E-19	2.91E-21	6.47E-22
2000	1.00E 00	6.31E-12	6.28E-15	1.40E-14	3.40E-15	3.48E-17	9.07E-18
2400	1.00E 00	6.23E-10	1.22E-12	3.38E-12	9.93E-13	1.81E-14	5.21E-15
2800	1.00E 00	1.67E-08	5.22E-11	1.71E-10	5.76E-11	1.57E-12	4.81E-13
3200	1.00E 00	1.96E-07	8.67E-10	3.26E-09	1.21E-09	4.42E-11	1.41E-11
3600	1.00E 00	1.33E-06	7.64E-09	3.23E-08	1.30E-08	5.90E-10	1.93E-10
4000	1.00E 00	6.17E-06	4.32E-08	2.02E-07	8.74E-08	4.65E-09	1.54E-09
4400	1.00E 00	2.15E-05	1.76E-07	9.08E-07	4.14E-07	2.50E-08	8.35E-09
4800	1.00E 00	6.05E-05	5.65E-07	3.18E-06	1.52E-06	1.01E-07	3.37E-08
5200	1.00E 00	1.45E-04	1.50E-06	9.17E-06	4.54E-06	3.26E-07	1.09E-07
5600	1.00E 00	3.03E-04	3.44E-06	2.27E-05	1.16E-05	8.84E-07	2.94E-07
6000	9.99E-01	5.73E-04	7.00E-06	4.98E-05	2.61E-05	2.09E-06	6.89E-07
6400	9.97E-01	9.3E-04	1.29E-05	9.88E-05	5.29E-05	4.39E-06	1.44E-06
6800	9.96E-01	1.61E-03	2.21E-05	1.80E-04	9.84E-05	8.41E-06	2.75E-06
7200	9.97E-01	2.45E-03	3.54E-05	3.08E-04	1.70E-04	1.49E-05	4.84E-06
7600	9.86E-01	3.55E-03	7.38E-05	4.94E-04	2.77E-04	2.47E-05	7.98E-06
8000	9.94E-01	4.94E-03	7.75E-05	7.58E-04	4.28E-04	3.88E-05	1.24E-05
8400	9.91E-01	6.63E-03	1.08E-04	1.11E-03	6.32E-04	8.81E-05	1.85E-05
8800	9.89E-01	8.62E-03	1.44E-04	1.56E-03	8.98E-04	8.34E-05	2.64E-05
9200	9.85E-01	1.09E-02	1.87E-04	2.13E-03	1.23E-03	1.15E-04	3.63E-05
9600	9.82E-01	1.35E-02	2.58E-04	2.83E-03	1.64E-03	1.55E-04	4.85E-05
10000	9.77E-01	1.63E-02	2.94E-04	3.65E-03	2.13E-03	2.02E-04	6.29E-05
11000	9.65E-01	2.44E-02	4.62E-04	6.33E-03	3.73E-03	3.54E-04	1.09E-04
12000	9.49E-01	3.35E-02	6.59E-04	9.87E-03	5.83E-03	5.61E-04	1.70E-04
13000	9.32E-01	4.31E-02	8.77E-04	1.42E-02	8.40E-03	8.10E-04	2.44E-04
14000	9.14E-01	5.28E-02	1.11E-03	1.92E-02	1.13E-02	1.10E-03	3.28E-04
15000	8.95E-01	6.22E-02	1.34E-03	2.46E-02	1.46E-02	1.41E-03	4.16E-04
16000	8.76E-01	7.13E-02	1.56E-03	3.04E-02	1.80E-02	1.74E-03	5.09E-04
17000	8.58E-01	7.97E-02	1.78E-03	3.64E-02	2.16E-02	2.08E-03	6.05E-04
18000	8.40E-01	8.76E-02	1.99E-03	4.26E-02	2.51E-02	2.42E-03	7.00E-04
19000	8.22E-01	9.47E-02	2.18E-03	4.87E-02	2.87E-02	2.76E-03	7.93E-04
20000	8.05E-01	1.01E-01	2.34E-03	5.47E-02	3.22E-02	3.09E-03	8.84E-04
24000	7.47E-01	1.27E-01	2.94E-03	7.74E-02	4.53E-02	4.31E-03	1.21E-03
28000	7.11E-01	1.35E-01	3.38E-03	9.70E-02	5.64E-02	5.32E-03	1.48E-03
32000	6.65E-01	1.44E-01	3.69E-03	1.13E-01	6.54E-02	6.15E-03	1.69E-03
36000	6.36E-01	1.51E-01	3.91E-03	1.27E-01	7.32E-02	6.85E-03	1.87E-03
40000	6.13E-01	1.55E-01	4.08E-03	1.39E-01	7.95E-02	7.39E-03	2.01E-03

TABLE 98. FRACTIONAL ELECTRONIC POPULATIONS OF NO⁺

TEMP. (°K)	X ¹ Σ ⁺	a ³ Σ ⁺	STATE 3Δ	3Π	A ¹ Π	3Σ ⁻
1200	1.00E-00	6.51E-21	2.00E-30	4.44E-33	7.21E-39	0.
1600	1.00E-00	1.06E-15	9.22E-23	9.30E-25	8.54E-29	1.54E-28
2000	1.00E-00	1.48E-12	3.67E-18	9.19E-20	5.55E-23	8.79E-23
2400	1.00E-00	1.83E-10	4.29E-15	1.97E-16	3.01E-19	6.05E-19
2800	1.00E-00	5.74E-09	6.68E-13	4.74E-14	1.62E-16	3.32E-16
3200	1.00E-00	7.62E-08	2.95E-11	2.90E-12	1.82E-14	3.74E-14
3600	1.00E-00	5.71E-07	5.62E-10	7.14E-11	1.18E-13	1.46E-12
4000	1.00E-00	2.86E-06	5.94E-09	9.27E-10	1.34E-11	2.72E-11
4400	1.00E-00	1.07E-05	4.10E-08	7.58E-09	1.51E-10	2.94E-10
4800	1.00E-00	3.22E-05	2.06E-07	4.37E-08	1.13E-09	2.12E-09
5200	1.00E-00	8.14E-05	8.07E-07	1.93E-07	6.16E-09	1.12E-08
5600	1.00E-00	1.82E-04	2.61E-06	6.89E-07	2.64E-08	4.62E-08
6000	1.00E-00	3.63E-04	7.22E-06	2.08E-06	9.30E-08	1.57E-07
6400	9.99E-01	6.65E-04	1.76E-05	5.47E-06	2.79E-07	4.53E-07
6800	9.99E-01	1.14E-03	3.88E-05	1.28E-05	7.35E-07	1.15E-06
7200	9.98E-01	1.83E-03	7.83E-05	2.74E-05	1.73E-06	2.61E-06
7600	9.97E-01	2.80E-03	1.47E-04	5.40E-05	3.72E-06	5.40E-06
8000	9.96E-01	4.10E-03	2.58E-04	9.93E-05	7.39E-06	1.04E-05
8400	9.94E-01	5.78E-03	4.30E-04	1.72E-04	1.37E-05	1.85E-05
8800	9.91E-01	7.90E-03	6.84E-04	2.83E-04	2.39E-05	3.14E-05
9200	9.88E-01	1.05E-02	1.04E-03	4.45E-04	3.94E-05	5.04E-05
9600	9.84E-01	1.34E-02	1.53E-03	6.71E-04	6.26E-05	7.75E-05
10000	9.79E-01	1.72E-02	2.18E-03	9.78E-04	9.52E-05	1.15E-04
11000	9.64E-01	2.87E-02	4.66E-03	2.20E-03	2.34E-04	2.64E-04
12000	9.43E-01	4.33E-02	8.85E-03	4.25E-03	4.84E-04	5.16E-04
13000	9.16E-01	6.04E-02	1.44E-02	7.27E-03	8.77E-04	8.89E-04
14000	8.85E-01	7.93E-02	2.18E-02	1.13E-02	1.43E-03	1.38E-03
15000	8.50E-01	9.89E-02	3.08E-02	1.63E-02	2.14E-03	1.99E-03
16000	8.13E-01	1.18E-01	4.10E-02	2.21E-02	2.99E-03	2.68E-03
17000	7.75E-01	1.37E-01	5.21E-02	2.85E-02	3.95E-03	3.43E-03
18000	7.36E-01	1.54E-01	6.34E-02	3.52E-02	5.00E-03	4.22E-03
19000	7.02E-01	1.70E-01	7.52E-02	4.21E-02	6.10E-03	5.01E-03
20000	6.67E-01	1.84E-01	8.68E-02	4.90E-02	7.22E-03	5.78E-03
24000	5.53E-01	2.24E-01	1.28E-01	7.44E-02	1.16E-02	8.53E-03
28000	4.73E-01	2.46E-01	1.61E-01	9.48E-02	1.52E-02	1.06E-02
32000	4.18E-01	2.57E-01	1.85E-01	1.10E-01	1.82E-02	1.21E-02
36000	3.78E-01	2.63E-01	2.03E-01	1.22E-01	2.05E-02	1.31E-02
40000	3.49E-01	2.65E-01	2.17E-01	1.32E-01	2.24E-02	1.39E-02

TABLE 99. FRACTIONAL ELECTRONIC POPULATIONS OF O₂

TEMP. (°K)	X 3 Σ_g^-	A 1 Δ_g	b 1 Σ_g^+	C 2 Δ_u	A 3 Σ_u^+	c 1 Σ_u^-	B 3 Σ_u^-
1200	1.00E-00	5.51E-05	5.27E-06	5.70E-18	1.35E-14	1.44E-19	5.51E-26
1600	9.99E-01	5.73E-04	2.73E-06	1.84E-13	5.20E-14	8.18E-15	1.63E-19
2000	9.98E-01	2.39E-03	2.91E-05	9.29E-11	2.89E-11	5.68E-12	1.25E-15
2400	9.94E-01	6.16E-03	1.41E-04	5.73E-09	1.90E-09	4.29E-10	4.80E-13
2800	9.88E-01	1.21E-02	4.35E-04	1.08E-07	3.68E-08	9.11E-09	3.31E-11
3200	9.79E-01	1.99E-02	1.01E-03	9.54E-07	3.30E-07	8.73E-08	7.76E-10
3600	9.69E-01	2.91E-02	1.93E-03	5.04E-06	1.78E-06	4.92E-07	8.84E-08
4000	9.57E-01	3.88E-02	2.25E-03	1.88E-05	6.68E-06	1.92E-06	6.08E-08
4400	9.43E-01	5.09E-02	4.95E-03	5.44E-05	1.94E-05	5.72E-06	2.89E-07
4800	9.30E-01	6.23E-02	7.01E-03	1.28E-04	4.62E-05	1.39E-05	1.04E-06
5200	9.16E-01	7.38E-02	9.39E-03	2.62E-04	9.50E-05	2.92E-05	3.05E-06
5600	9.02E-01	8.51E-02	1.20E-02	4.78E-04	1.74E-04	5.49E-05	7.54E-06
6000	8.88E-01	9.60E-02	1.48E-02	7.94E-04	2.90E-04	9.17E-05	1.64E-05
6400	8.74E-01	1.07E-01	1.78E-02	1.23E-03	4.49E-04	1.44E-04	3.19E-05
6800	8.60E-01	1.16E-01	2.09E-02	1.79E-03	6.54E-04	2.11E-04	5.69E-05
7200	8.46E-01	1.26E-01	2.39E-02	2.47E-03	9.07E-04	2.95E-04	9.44E-05
7600	8.33E-01	1.35E-01	2.70E-02	3.28E-03	1.21E-03	3.95E-04	1.48E-04
8000	8.21E-01	1.43E-01	3.00E-02	4.20E-03	1.55E-03	5.10E-04	2.19E-04
8400	8.09E-01	1.50E-01	3.30E-02	5.23E-03	1.93E-03	6.39E-04	3.11E-04
8800	7.97E-01	1.57E-01	3.58E-02	6.35E-03	2.34E-03	7.81E-04	4.27E-04
9200	7.84E-01	1.64E-01	3.85E-02	7.54E-03	2.79E-03	9.33E-04	5.44E-04
9600	7.75E-01	1.70E-01	4.11E-02	8.80E-03	3.25E-03	1.09E-03	7.31E-04
10000	7.65E-01	1.75E-01	4.36E-02	1.01E-02	3.74E-03	1.26E-03	9.21E-04
11000	7.42E-01	1.87E-01	4.93E-02	1.34E-02	4.99E-03	1.70E-03	1.51E-03
12000	7.22E-01	1.96E-01	5.41E-02	1.69E-02	6.27E-03	2.15E-03	2.24E-03
13000	7.05E-01	2.04E-01	5.83E-02	2.03E-02	7.53E-03	2.59E-03	3.10E-03
14000	6.89E-01	2.10E-01	6.19E-02	2.35E-02	8.73E-03	3.02E-03	4.07E-03
15000	6.76E-01	2.14E-01	6.49E-02	2.65E-02	9.87E-03	3.43E-03	5.11E-03
16000	6.64E-01	2.18E-01	6.75E-02	2.94E-02	1.09E-02	3.81E-03	6.21E-03
17000	6.53E-01	2.22E-01	6.97E-02	3.20E-02	1.19E-02	4.17E-03	7.35E-03
18000	6.44E-01	2.24E-01	7.16E-02	3.45E-02	1.28E-02	4.50E-03	8.52E-03
19000	6.35E-01	2.26E-01	7.33E-02	3.67E-02	1.37E-02	4.81E-03	9.69E-03
20000	6.28E-01	2.28E-01	7.48E-02	3.88E-02	1.45E-02	5.09E-03	1.09E-02
2400	6.04E-01	2.33E-01	7.90E-02	4.57E-02	1.70E-02	6.04E-03	1.54E-02
28000	5.87E-01	2.35E-01	8.16E-02	5.08E-02	1.89E-02	6.75E-03	1.94E-02
32000	5.74E-01	2.37E-01	8.34E-02	5.44E-02	2.04E-02	7.29E-03	2.33E-02
36000	5.65E-01	2.37E-01	8.46E-02	5.78E-02	2.15E-02	7.72E-03	2.64E-02
40000	5.57E-01	2.38E-01	8.55E-02	6.00E-02	2.24E-02	8.04E-03	2.95E-02

TABLE 100. FRACTIONAL ELECTRONIC POPULATIONS OF G^+

TEMP. (°K)	$X \text{ } ^2\Pi_g$	$a \text{ } ^4\Pi_u$	$\lambda \text{ } ^2\Pi_u$	STATE $S \text{ } ^4\Sigma_g^-$
1200	1.00E-00	5.40E-17	2.04E-20	4.55E-26
1600	1.00E-00	9.53E-13	2.95E-15	1.17E-19
2000	1.00E-00	5.40E-10	3.06E-12	6.30E-16
2400	1.00E-00	1.72E-08	3.17E-10	3.08E-13
2800	1.00E-00	2.86E-07	6.76E-09	2.12E-11
3200	1.00E-00	2.34E-06	1.06E-07	5.10E-10
3600	1.00E-00	1.22E-05	7.36E-07	6.07E-09
4000	1.00E-00	4.55E-05	3.47E-06	4.41E-08
4400	1.00E-00	1.34E-04	1.23E-05	2.24E-07
4800	1.00E-00	3.29E-04	3.50E-05	8.64E-07
5200	9.99E-01	7.02E-04	6.44E-05	4.71E-06
5600	9.99E-01	1.34E-03	1.79E-04	7.20E-06
6000	9.97E-01	2.35E-03	3.41E-04	1.67E-05
6400	9.96E-01	3.81E-03	5.96E-04	3.45E-05
6800	9.93E-01	5.65E-03	9.70E-04	6.64E-05
7200	9.90E-01	8.46E-03	1.49E-03	1.17E-04
7600	9.86E-01	1.18E-02	2.16E-03	1.94E-04
8000	9.81E-01	1.57E-02	3.01E-03	3.04E-04
8400	9.74E-01	2.04E-02	4.05E-03	4.54E-04
8800	9.68E-01	2.57E-02	5.26E-03	6.52E-04
9200	9.61E-01	3.16E-02	6.65E-03	9.02E-04
9600	9.52E-01	3.81E-02	8.21E-03	1.21E-03
10000	9.44E-01	4.50E-02	9.91E-03	1.58E-03
11000	9.19E-01	6.37E-02	1.47E-02	2.77E-03
12000	8.92E-01	8.35E-02	2.00E-02	4.35E-03
13000	8.65E-01	1.03E-01	2.55E-02	6.26E-03
14000	8.38E-01	1.22E-01	3.09E-02	8.45E-03
15000	8.13E-01	1.40E-01	3.62E-02	1.08E-02
16000	7.89E-01	1.57E-01	4.11E-02	1.34E-02
17000	7.67E-01	1.72E-01	4.58E-02	1.60E-02
18000	7.46E-01	1.85E-01	5.00E-02	1.86E-02
19000	7.27E-01	1.98E-01	5.39E-02	2.13E-02
20000	7.10E-01	2.08E-01	5.74E-02	2.39E-02
24000	6.55E-01	2.42E-01	6.87E-02	3.38E-02
28000	6.17E-01	2.64E-01	7.66E-02	4.25E-02
32000	5.88E-01	2.80E-01	8.22E-02	4.99E-02
36000	5.67E-01	2.91E-01	8.64E-02	5.63E-02
40000	5.50E-01	2.99E-01	8.95E-02	6.17E-02

TABLE 101. FRACTIONAL ELECTRONIC POPULATIONS OF CO

TEMP. (°K)	STATE					
	$X^1\Sigma^+$	$a^3\Pi$	$a^3\Sigma^+$	$d^3\Delta$	$e^3\Sigma^-$	$I^1\Sigma^-$
1200	1.00E-00	4.18E-25	7.69E-29	2.92E-31	3.87E-33	5.10E-34
1600	1.00E-00	8.78E-19	1.36E-21	2.48E-23	8.28E-25	1.30E-26
2000	1.00E-00	5.49E-15	1.03E-17	1.44E-18	6.34E-20	1.73E-20
2400	1.00E-00	1.87E-12	2.41E-14	2.16E-15	1.82E-16	4.19E-17
2800	1.00E-00	1.20E-10	2.86E-12	4.04E-13	4.44E-14	1.10E-14
3200	1.00E-00	2.74E-09	1.03E-10	2.05E-10	2.75E-12	7.18E-13
3600	1.00E-00	3.12E-08	1.67E-09	4.16E-10	8.64E-11	1.14E-11
4000	1.00E-00	2.19E-07	1.56E-08	5.04E-09	8.95E-10	2.51E-10
4400	1.00E-00	1.08E-06	9.74E-08	1.64E-08	7.37E-09	1.61E-09
4800	1.00E-00	4.08E-06	4.48E-07	1.93E-07	4.21E-08	1.40E-08
5200	1.00E-00	1.25E-05	1.63E-06	9.20E-07	1.83E-07	5.62E-08
5600	1.00E-00	3.24E-05	4.95E-06	2.76E-06	6.78E-07	2.04E-07
6000	1.00E-00	7.58E-05	1.29E-05	7.31E-06	2.03E-06	6.21E-07
6400	1.00E-00	1.58E-04	3.90E-05	1.99E-05	5.37E-06	1.64E-06
6800	1.00E-00	3.01E-04	6.31E-05	4.47E-05	1.26E-05	3.87E-06
7200	9.93E-01	5.36E-04	1.22E-04	9.19E-05	2.68E-05	8.28E-06
7600	9.99E-01	8.96E-04	2.20E-04	1.75E-04	5.25E-05	1.63E-05
8000	9.93E-01	1.42E-03	3.74E-04	3.12E-04	9.60E-05	2.99E-05
8400	9.96E-01	2.16E-03	6.04E-04	5.24E-04	1.65E-04	5.17E-05
8800	9.95E-01	3.16E-03	9.32E-04	8.40E-04	2.70E-04	8.47E-05
9200	9.92E-01	4.46E-03	1.38E-03	1.79E-03	4.23E-04	1.33E-04
9600	9.83E-01	6.11E-03	1.96E-03	2.60E-03	6.34E-04	1.99E-04
10000	9.65E-01	8.15E-03	2.75E-03	2.71E-03	9.11E-04	2.89E-04
11000	9.79E-01	1.51E-02	5.56E-03	5.82E-03	2.03E-03	6.40E-04
12000	9.48E-01	2.50E-02	9.82E-03	1.08E-02	3.84E-03	1.22E-03
13000	9.13E-01	3.75E-02	1.56E-02	1.77E-02	6.43E-03	2.04E-03
14000	8.81E-01	5.21E-02	2.27E-02	2.66E-02	9.82E-03	3.11E-03
15000	8.43E-01	6.80E-02	3.07E-02	3.70E-02	1.38E-02	4.39E-03
16000	7.99E-01	8.49E-02	3.94E-02	4.84E-02	1.83E-02	5.81E-03
17000	7.55E-01	1.01E-01	4.82E-02	6.03E-02	2.31E-02	7.32E-03
18000	7.11E-01	1.16E-01	5.69E-02	7.23E-02	2.79E-02	8.84E-03
19000	6.69E-01	1.30E-01	6.52E-02	8.40E-02	3.26E-02	1.03E-02
20000	5.30E-01	1.43E-01	7.30E-02	9.51E-02	3.71E-02	1.18E-02
24000	5.05E-01	1.61E-01	9.78E-02	1.12E-01	5.27E-02	1.66E-02
28000	4.73E-01	2.06E-01	1.14E-01	1.58E-01	6.34E-02	2.01E-02
32000	3.63E-01	2.21E-01	1.25E-01	1.75E-01	7.10E-02	2.25E-02
36000	3.31E-01	2.30E-01	1.32E-01	1.86E-01	7.65E-02	2.42E-02
40000	3.05E-01	2.39E-01	1.37E-01	1.97E-01	8.06E-02	2.55E-02

TABLE 102. DIMENSIONLESS PRESSURE, PV/RT, OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
1000	3.982E 00	3.981E 00	3.979E 00	3.973E 00	3.956E 00	3.905E 00	3.773E 00	3.508E 00	3.135E 00	2.766E 00	2.477E 00
1050	3.982E 00	3.982E 00	3.981E 00	3.978E 00	3.970E 00	3.947E 00	3.808E 00	3.717E 00	3.417E 00	3.035E 00	2.682E 00
1100	3.985E 00	3.983E 00	3.982E 00	3.980E 00	3.974E 00	3.945E 00	3.932E 00	3.840E 00	3.634E 00	3.296E 00	2.913E 00
1150	3.994E 00	3.986E 00	3.983E 00	3.981E 00	3.979E 00	3.973E 00	3.956E 00	3.906E 00	3.777E 00	3.517E 00	3.149E 00
1200	4.025E 00	3.994E 00	3.986E 00	3.983E 00	3.981E 00	3.977E 00	3.947E 00	3.939E 00	3.862E 00	3.681E 00	3.365E 00
1250	4.109E 00	4.027E 00	3.997E 00	3.986E 00	3.982E 00	3.979E 00	3.973E 00	3.957E 00	3.911E 00	3.791E 00	3.544E 00
1300	4.287E 00	4.104E 00	4.025E 00	3.996E 00	3.986E 00	3.981E 00	3.977E 00	3.966E 00	3.938E 00	3.860E 00	3.686E 00
1350	4.572E 00	4.262E 00	4.092E 00	4.020E 00	3.994E 00	3.984E 00	3.979E 00	3.972E 00	3.933E 00	3.903E 00	3.775E 00
1400	4.904E 00	4.511E 00	4.224E 00	4.075E 00	4.013E 00	3.991E 00	3.982E 00	3.976E 00	3.963E 00	3.929E 00	3.840E 00
1450	5.205E 00	4.815E 00	4.435E 00	4.180E 00	4.055E 00	4.006E 00	3.988E 00	3.979E 00	3.949E 00	3.945E 00	3.883E 00
1500	5.438E 00	5.109E 00	4.705E 00	4.351E 00	4.135E 00	4.036E 00	3.998E 00	3.983E 00	3.973E 00	3.956E 00	3.911E 00
1550	5.618E 00	5.352E 00	4.987E 00	4.581E 00	4.260E 00	4.093E 00	4.019E 00	3.991E 00	3.978E 00	3.963E 00	3.930E 00
1600	5.755E 00	5.543E 00	5.237E 00	4.840E 00	4.452E 00	4.188E 00	4.050E 00	4.005E 00	3.984E 00	3.968E 00	3.942E 00
1650	5.851E 00	5.692E 00	5.442E 00	5.091E 00	4.678E 00	4.329E 00	4.123E 00	4.030E 00	3.993E 00	3.974E 00	3.952E 00
1700	5.908E 00	5.802E 00	5.606E 00	5.309E 00	4.916E 00	4.513E 00	4.223E 00	4.072E 00	4.008E 00	3.981E 00	3.959E 00
1750	5.940E 00	5.875E 00	5.733E 00	5.490E 00	5.141E 00	4.723E 00	4.360E 00	4.137E 00	4.034E 00	3.991E 00	3.966E 00
1800	5.958E 00	5.915E 00	5.824E 00	5.635E 00	5.337E 00	4.940E 00	4.531E 00	4.232E 00	4.074E 00	4.007E 00	3.974E 00
1850	5.969E 00	5.944E 00	5.884E 00	5.747E 00	5.502E 00	5.145E 00	4.722E 00	4.357E 00	4.135E 00	4.030E 00	3.984E 00
1900	5.980E 00	5.960E 00	5.921E 00	5.828E 00	5.636E 00	5.327E 00	4.919E 00	4.510E 00	4.218E 00	4.066E 00	3.999E 00
1950	5.994E 00	5.972E 00	5.944E 00	5.882E 00	5.740E 00	5.482E 00	5.108E 00	4.680E 00	4.326E 00	4.117E 00	4.019E 00
2000	6.016E 00	5.984E 00	5.960E 00	5.918E 00	5.817E 00	5.611E 00	5.280E 00	4.858E 00	4.457E 00	4.185E 00	4.048E 00
2200	6.371E 00	6.136E 00	6.031E 00	5.986E 00	5.951E 00	5.888E 00	5.745E 00	5.473E 00	5.076E 00	4.639E 00	4.293E 00
2400	7.181E 00	6.745E 00	6.356E 00	6.127E 00	6.023E 00	5.972E 00	5.917E 00	5.803E 00	5.568E 00	5.191E 00	4.744E 00
2600	7.719E 00	7.446E 00	7.050E 00	6.604E 00	6.261E 00	6.078E 00	5.994E 00	5.930E 00	5.822E 00	5.598E 00	5.225E 00
2800	7.919E 00	7.815E 00	7.607E 00	7.252E 00	6.802E 00	6.392E 00	6.138E 00	6.014E 00	5.934E 00	5.815E 00	5.579E 00
3000	7.997E 00	7.945E 00	7.863E 00	7.686E 00	7.365E 00	6.929E 00	6.486E 00	6.185E 00	6.028E 00	5.926E 00	5.784E 00
3200	8.190E 00	8.041E 00	7.966E 00	7.886E 00	7.728E 00	7.424E 00	6.988E 00	6.531E 00	6.205E 00	6.026E 00	5.901E 00
3400	8.705E 00	8.313E 00	8.093E 00	7.986E 00	7.896E 00	7.735E 00	7.431E 00	6.989E 00	6.526E 00	6.195E 00	6.005E 00
3600	9.316E 00	8.856E 00	8.418E 00	8.141E 00	8.002E 00	7.895E 00	7.718E 00	7.395E 00	6.937E 00	6.477E 00	6.154E 00
3800	9.712E 00	9.394E 00	8.944E 00	8.485E 00	8.174E 00	8.008E 00	7.880E 00	7.676E 00	7.318E 00	6.840E 00	6.393E 00
4000	9.927E 00	9.737E 00	9.424E 00	8.977E 00	8.509E 00	8.182E 00	7.899E 00	7.847E 00	7.401E 00	7.197E 00	6.704E 00
4200	1.013E 01	9.941E 00	9.739E 00	9.416E 00	8.960E 00	8.472E 00	8.166E 00	7.975E 00	7.788E 00	7.446E 00	7.031E 00
4400	1.048E 01	1.015E 01	9.940E 00	9.717E 00	9.372E 00	8.901E 00	8.439E 00	8.126E 00	7.925E 00	7.695E 00	7.323E 00
4600	1.094E 01	1.049E 01	1.015E 01	9.921E 00	9.671E 00	9.292E 00	8.802E 00	8.358E 00	8.065E 00	7.847E 00	7.553E 00
4800	1.133E 01	1.091E 01	1.046E 01	1.012E 01	9.880E 00	9.594E 00	9.172E 00	8.671E 00	8.257E 00	7.983E 00	7.728E 00
5000	1.166E 01	1.128E 01	1.085E 01	1.040E 01	1.007E 01	9.814E 00	9.481E 00	9.014E 00	8.517E 00	8.143E 00	7.871E 00
6000	1.204E 01	1.197E 01	1.189E 01	1.176E 01	1.149E 01	1.108E 01	1.058E 01	1.015E 01	9.802E 00	9.389E 00	8.863E 00
7000	1.236E 01	1.231E 01	1.220E 01	1.208E 01	1.197E 01	1.187E 01	1.167E 01	1.132E 01	1.082E 01	1.030E 01	9.856E 00
8000	1.239E 01	1.239E 01	1.238E 01	1.234E 01	1.227E 01	1.214E 01	1.201E 01	1.188E 01	1.166E 01	1.127E 01	1.079E 01

100000	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.238E 01	1.238E 01	1.237E 01	1.237E 01	1.237E 01
150000	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01
200000	1.247E 01	1.243E 01	1.240E 01	1.240E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01	1.239E 01
300000	1.502E 01	1.522E 01	1.471E 01	1.430E 01	1.405E 01	1.386E 01	1.357E 01	1.315E 01	1.246E 01
400000	1.640E 01	1.630E 01	1.626E 01	1.613E 01	1.602E 01	1.590E 01	1.568E 01	1.528E 01	1.473E 01
500000	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.642E 01	1.639E 01	1.633E 01	1.621E 01	1.606E 01
600000	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.642E 01	1.640E 01
800000	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01
1000000	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01	1.643E 01
1500000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.644E 01	1.644E 01	1.644E 01	1.643E 01
2000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
3000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
4000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
5000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
6000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
8000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01
10000000	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01

TABLE 102(CONT) DIMENSIONLESS PRESSURE, PV/RT, OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
1000	2.282E 00	2.160E 00	2.087E 00	2.042E 00	2.008E 00	1.966E 00	1.886E 00	1.757E 00	1.597E 00	1.431E 00
1050	2.419E 00	2.245E 00	2.138E 00	2.073E 00	2.031E 00	1.992E 00	1.934E 00	1.827E 00	1.675E 00	1.517E 00
1100	2.587E 00	2.354E 00	2.205E 00	2.113E 00	2.057E 00	2.015E 00	1.967E 00	1.832E 00	1.746E 00	1.584E 00
1150	2.779E 00	2.487E 00	2.289E 00	2.165E 00	2.088E 00	2.038E 00	1.993E 00	1.924E 00	1.807E 00	1.650E 00
1200	2.983E 00	2.642E 00	2.392E 00	2.228E 00	2.127E 00	2.064E 00	2.015E 00	1.957E 00	1.850E 00	1.711E 00
1250	3.184E 00	2.811E 00	2.512E 00	2.305E 00	2.174E 00	2.093E 00	2.038E 00	1.983E 00	1.900E 00	1.767E 00
1300	3.366E 00	2.966E 00	2.646E 00	2.395E 00	2.231E 00	2.128E 00	2.062E 00	2.007E 00	1.933E 00	1.815E 00
1350	3.520E 00	3.157E 00	2.789E 00	2.497E 00	2.296E 00	2.169E 00	2.088E 00	2.025E 00	1.962E 00	1.857E 00
1400	3.642E 00	3.315E 00	2.937E 00	2.609E 00	2.371E 00	2.215E 00	2.110E 00	2.050E 00	1.986E 00	1.893E 00
1450	3.733E 00	3.453E 00	3.083E 00	2.727E 00	2.454E 00	2.269E 00	2.151E 00	2.073E 00	2.008E 00	1.923E 00
1500	3.799E 00	3.548E 00	3.221E 00	2.850E 00	2.543E 00	2.328E 00	2.188E 00	2.098E 00	2.029E 00	1.950E 00
1550	3.846E 00	3.600E 00	3.346E 00	2.972E 00	2.639E 00	2.393E 00	2.230E 00	2.125E 00	2.050E 00	1.973E 00
1600	3.879E 00	3.731E 00	3.456E 00	3.092E 00	2.738E 00	2.463E 00	2.275E 00	2.154E 00	2.071E 00	1.995E 00
1650	3.903E 00	3.785E 00	3.550E 00	3.204E 00	2.838E 00	2.537E 00	2.325E 00	2.186E 00	2.093E 00	2.015E 00
1700	3.919E 00	3.826E 00	3.627E 00	3.307E 00	2.938E 00	2.615E 00	2.378E 00	2.220E 00	2.116E 00	2.035E 00
1750	3.932E 00	3.856E 00	3.650E 00	3.400E 00	3.035E 00	2.694E 00	2.434E 00	2.257E 00	2.140E 00	2.054E 00
1800	3.942E 00	3.880E 00	3.746E 00	3.481E 00	3.128E 00	2.774E 00	2.492E 00	2.296E 00	2.166E 00	2.073E 00
1850	3.951E 00	3.898E 00	3.780E 00	3.551E 00	3.215E 00	2.854E 00	2.553E 00	2.337E 00	2.193E 00	2.092E 00
1900	3.960E 00	3.912E 00	3.812E 00	3.611E 00	3.295E 00	2.933E 00	2.615E 00	2.380E 00	2.221E 00	2.111E 00
1950	3.971E 00	3.924E 00	3.838E 00	3.662E 00	3.368E 00	3.009E 00	2.678E 00	2.425E 00	2.251E 00	2.131E 00
2000	3.983E 00	3.935E 00	3.859E 00	3.704E 00	3.433E 00	3.082E 00	2.740E 00	2.471E 00	2.282E 00	2.151E 00
2050	4.092E 00	3.990E 00	3.918E 00	3.815E 00	3.627E 00	3.331E 00	2.981E 00	2.660E 00	2.414E 00	2.238E 00
2100	4.360E 00	4.118E 00	3.985E 00	3.883E 00	3.742E 00	3.509E 00	3.186E 00	2.845E 00	2.552E 00	2.329E 00
2150	4.772E 00	4.374E 00	4.113E 00	3.957E 00	3.821E 00	3.630E 00	3.348E 00	3.011E 00	2.686E 00	2.422E 00
2200	5.193E 00	4.734E 00	4.338E 00	4.075E 00	3.898E 00	3.720E 00	3.475E 00	3.154E 00	2.810E 00	2.513E 00
2250	5.517E 00	5.104E 00	4.641E 00	4.261E 00	4.003E 00	3.802E 00	3.572E 00	3.274E 00	2.923E 00	2.600E 00
2300	5.724E 00	5.409E 00	4.963E 00	4.507E 00	4.151E 00	3.895E 00	3.659E 00	3.376E 00	3.023E 00	2.682E 00
2350	5.853E 00	5.624E 00	5.250E 00	4.779E 00	4.344E 00	4.014E 00	3.748E 00	3.467E 00	3.113E 00	2.758E 00
2400	5.959E 00	5.770E 00	5.474E 00	5.040E 00	4.584E 00	4.161E 00	3.847E 00	3.555E 00	3.196E 00	2.829E 00
2450	6.092E 00	5.883E 00	5.639E 00	5.265E 00	4.790E 00	4.333E 00	3.962E 00	3.643E 00	3.275E 00	2.897E 00
2500	6.284E 00	6.002E 00	5.766E 00	5.446E 00	5.002E 00	4.517E 00	4.093E 00	3.736E 00	3.353E 00	2.962E 00
2550	6.539E 00	6.155E 00	5.881E 00	5.591E 00	5.188E 00	4.701E 00	4.236E 00	3.837E 00	3.433E 00	3.025E 00
2600	6.827E 00	6.356E 00	6.008E 00	5.713E 00	5.345E 00	4.875E 00	4.385E 00	3.947E 00	3.516E 00	3.090E 00
2650	7.108E 00	6.595E 00	6.163E 00	5.830E 00	5.480E 00	5.033E 00	4.534E 00	4.063E 00	3.603E 00	3.157E 00
2700	7.353E 00	6.849E 00	6.351E 00	5.957E 00	5.601E 00	5.175E 00	4.678E 00	4.181E 00	3.695E 00	3.215E 00
2750	7.553E 00	7.092E 00	6.562E 00	6.101E 00	5.716E 00	5.302E 00	4.813E 00	4.301E 00	3.789E 00	3.256E 00
2800	7.845E 00	7.328E 00	6.759E 00	6.202E 00	5.782E 00	5.382E 00	4.877E 00	4.347E 00	3.826E 00	3.293E 00
2850	8.383E 00	7.810E 00	7.171E 00	6.551E 00	6.112E 00	5.712E 00	5.233E 00	4.723E 00	4.172E 00	3.637E 00
2900	1.017E 01	9.650E 00	9.067E 00	8.418E 00	7.789E 00	7.163E 00	6.491E 00	5.807E 00	5.133E 00	4.452E 00

15CC00	1.231E 01	1.222E 01	1.203E 01	1.192E 00	1.041E 00	0.274E 00	7.497E 00	6.721E 00	5.942E 00	5.119E 00
20CC00	1.236E 01	1.233E 01	1.227E 01	1.171E 01	1.121E 01	1.050E 01	9.623E 00	8.664E 00	7.674E 00	6.638E 00
30CC00	1.240E 01	1.237E 01	1.234E 01	1.215E 01	1.193E 01	1.152E 01	1.090E 01	1.004E 01	9.019E 00	7.884E 00
40CC00	1.359E 01	1.314E 01	1.273E 01	1.248E 01	1.233E 01	1.219E 01	1.200E 01	1.169E 01	1.120E 01	1.045E 01
5CC00	1.512E 01	1.454E 01	1.405E 01	1.362E 01	1.312E 01	1.244E 01	1.228E 01	1.194E 01	1.155E 01	1.094E 01
60CC00	1.603E 01	1.579E 01	1.538E 01	1.479E 01	1.419E 01	1.343E 01	1.305E 01	1.246E 01	1.192E 01	1.134E 01
80CC00	1.641E 01	1.638E 01	1.630E 01	1.614E 01	1.584E 01	1.542E 01	1.478E 01	1.401E 01	1.322E 01	1.239E 01
100CC00	1.642E 01	1.642E 01	1.640E 01	1.637E 01	1.629E 01	1.612E 01	1.580E 01	1.528E 01	1.452E 01	1.368E 01
150CC00	1.643E 01	1.642E 01	1.642E 01	1.641E 01	1.639E 01	1.635E 01	1.629E 01	1.615E 01	1.589E 01	1.541E 01
200CC00	1.643E 01	1.643E 01	1.642E 01	1.642E 01	1.641E 01	1.638E 01	1.635E 01	1.627E 01	1.614E 01	1.596E 01
300CC00	1.643E 01	1.644E 01	1.644E 01	1.643E 01	1.642E 01	1.641E 01	1.639E 01	1.635E 01	1.628E 01	1.616E 01
400CC00	1.643E 01	1.645E 01	1.645E 01	1.644E 01	1.644E 01	1.643E 01	1.641E 01	1.638E 01	1.634E 01	1.626E 01
500CC00	1.643E 01	1.645E 01	1.645E 01	1.645E 01	1.644E 01	1.644E 01	1.643E 01	1.641E 01	1.638E 01	1.632E 01
600CC00	1.643E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.644E 01	1.643E 01	1.642E 01	1.640E 01	1.635E 01
800CC00	1.643E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.644E 01	1.644E 01	1.643E 01	1.642E 01	1.639E 01
1000CC00	1.643E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.645E 01	1.644E 01	1.644E 01	1.643E 01	1.641E 01

TABLE 103. PRESSURE (ATM) OF EQUILIBRIUM AIR

TEMP. (°C K.)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
10500	1.450E-07	4.609E-07	1.457E-06	4.600E-06	1.446E-05	4.521E-05	1.381E-04	4.061E-04	1.148E-03	3.202E-03	9.048E-03
10500	1.531E-07	4.840E-07	1.530E-06	4.836E-06	1.528E-05	4.798E-05	1.492E-04	4.519E-04	1.314E-03	3.690E-03	1.031E-02
11000	1.605E-07	5.072E-07	1.603E-06	5.068E-06	1.601E-05	5.049E-05	1.583E-04	4.890E-04	1.463E-03	4.198E-03	1.173E-02
11500	1.682E-07	5.304E-07	1.677E-06	5.300E-06	1.675E-05	5.289E-05	1.645E-04	5.200E-04	1.590E-03	4.602E-03	1.326E-02
12000	1.768E-07	5.552E-07	1.751E-06	5.533E-06	1.749E-05	5.525E-05	1.743E-04	5.473E-04	1.697E-03	5.113E-03	1.478E-02
12500	1.860E-07	5.827E-07	1.829E-06	5.769E-06	1.822E-05	5.758E-05	1.818E-04	5.726E-04	1.790E-03	5.486E-03	1.622E-02
13000	2.040E-07	6.177E-07	1.916E-06	6.014E-06	1.897E-05	5.992E-05	1.893E-04	5.769E-04	1.874E-03	5.810E-03	1.751E-02
13500	2.259E-07	6.640E-07	2.022E-06	6.283E-06	1.974E-05	6.227E-05	1.967E-04	6.208E-04	1.954E-03	6.100E-03	1.866E-02
14000	2.514E-07	7.311E-07	2.165E-06	6.604E-06	2.057E-05	6.468E-05	2.041E-04	6.443E-04	2.031E-03	6.368E-03	1.968E-02
14500	2.763E-07	8.083E-07	2.354E-06	7.016E-06	2.153E-05	6.724E-05	2.117E-04	6.479E-04	2.107E-03	6.622E-03	2.061E-02
15000	2.986E-07	8.872E-07	2.584E-06	7.555E-06	2.270E-05	7.009E-05	2.196E-04	6.917E-04	2.182E-03	6.869E-03	2.148E-02
15500	3.188E-07	9.604E-07	2.830E-06	8.220E-06	2.421E-05	7.344E-05	2.281E-04	7.162E-04	2.257E-03	7.111E-03	2.230E-02
16000	3.371E-07	1.027E-06	3.068E-06	8.965E-06	2.602E-05	7.758E-05	2.377E-04	7.418E-04	2.333E-03	7.351E-03	2.309E-02
16500	3.534E-07	1.087E-06	3.287E-06	9.724E-06	2.826E-05	8.270E-05	2.480E-04	7.698E-04	2.412E-03	7.591E-03	2.387E-02
17000	3.677E-07	1.142E-06	3.489E-06	1.045E-05	3.060E-05	8.822E-05	2.628E-04	8.013E-04	2.493E-03	7.835E-03	2.464E-02
17500	3.805E-07	1.190E-06	3.673E-06	1.112E-05	3.293E-05	9.549E-05	2.793E-04	8.382E-04	2.584E-03	8.086E-03	2.541E-02
18000	3.928E-07	1.233E-06	3.838E-06	1.174E-05	3.517E-05	1.029E-04	2.986E-04	8.819E-04	2.685E-03	8.349E-03	2.619E-02
18500	4.043E-07	1.273E-06	3.985E-06	1.231E-05	3.726E-05	1.102E-04	3.190E-04	9.332E-04	2.800E-03	8.632E-03	2.698E-02
19000	4.160E-07	1.311E-06	4.119E-06	1.282E-05	3.920E-05	1.172E-04	3.421E-04	9.919E-04	2.934E-03	8.943E-03	2.781E-02
19500	4.279E-07	1.348E-06	4.244E-06	1.328E-05	4.098E-05	1.238E-04	3.646E-04	1.056E-03	3.088E-03	9.293E-03	2.863E-02
20000	4.403E-07	1.386E-06	4.364E-06	1.370E-05	4.259E-05	1.299E-04	3.864E-04	1.125E-03	3.263E-03	9.691E-03	2.964E-02
20500	4.532E-07	1.503E-06	4.857E-06	1.524E-05	4.793E-05	1.500E-04	4.627E-04	1.394E-03	4.088E-03	1.182E-02	3.458E-02
21000	4.630E-07	1.874E-06	5.585E-06	1.702E-05	5.292E-05	1.659E-04	5.199E-04	1.612E-03	4.892E-03	1.442E-02	4.168E-02
21500	4.734E-07	2.241E-06	6.711E-06	1.988E-05	5.959E-05	1.830E-04	5.705E-04	1.785E-03	5.541E-03	1.685E-02	4.974E-02
22000	4.819E-07	2.532E-06	7.792E-06	2.351E-05	6.973E-05	2.072E-04	6.292E-04	1.950E-03	6.082E-03	1.885E-02	5.719E-02
22500	4.883E-07	2.759E-06	8.635E-06	2.669E-05	8.093E-05	2.404E-04	7.124E-04	2.148E-03	6.620E-03	2.058E-02	6.353E-02
23000	4.959E-07	2.979E-06	9.332E-06	2.921E-05	9.050E-05	2.750E-04	8.186E-04	2.420E-03	7.269E-03	2.232E-02	6.913E-02
23500	5.048E-06	3.272E-06	1.007E-05	3.143E-05	9.828E-05	3.044E-04	9.250E-04	2.751E-03	8.123E-03	2.438E-02	7.474E-02
24000	5.122E-06	3.691E-06	1.109E-05	3.393E-05	1.055E-04	3.290E-04	1.017E-03	3.082E-03	9.142E-03	2.700E-02	8.113E-02
24500	5.200E-06	4.132E-06	1.244E-05	3.733E-05	1.137E-04	3.523E-04	1.096E-03	3.377E-03	1.010E-02	3.009E-02	8.894E-02
25000	5.283E-06	4.509E-06	1.380E-05	4.157E-05	1.246E-04	3.789E-04	1.171E-03	3.634E-03	1.113E-02	3.333E-02	9.816E-02
25500	5.371E-06	4.834E-06	1.597E-05	4.579E-05	1.378E-04	4.129E-04	1.256E-03	3.877E-03	1.198E-02	3.640E-02	1.081E-01
26000	5.464E-06	5.171E-06	1.601E-05	4.950E-05	1.510E-04	4.534E-04	1.359E-03	4.139E-03	1.274E-02	3.919E-02	1.193E-01
26500	5.565E-06	5.585E-06	1.709E-05	5.283E-05	1.629E-04	4.948E-04	1.482E-03	4.451E-03	1.358E-02	4.179E-02	1.272E-01
27000	5.674E-06	6.063E-06	1.838E-05	5.624E-05	1.736E-04	5.331E-04	1.612E-03	4.819E-03	1.451E-02	4.436E-02	1.359E-01
27500	5.792E-06	6.532E-06	1.986E-05	6.016E-05	1.844E-04	5.681E-04	1.735E-03	5.217E-03	1.559E-02	4.713E-02	1.441E-01
28000	5.918E-06	7.063E-06	2.161E-05	6.466E-05	2.024E-04	6.094E-04	1.852E-03	5.627E-03	1.672E-02	5.022E-02	1.528E-01
28500	6.052E-06	7.658E-06	2.372E-05	7.087E-05	2.280E-04	6.617E-04	1.977E-03	6.077E-03	1.807E-02	5.377E-02	1.622E-01
29000	6.194E-06	8.320E-06	2.625E-05	7.814E-05	2.625E-04	7.282E-04	2.117E-03	6.582E-03	1.964E-02	5.764E-02	1.728E-01
29500	6.345E-06	9.064E-06	2.925E-05	8.684E-05	3.069E-04	8.044E-04	2.282E-03	7.157E-03	2.148E-02	6.194E-02	1.847E-01
30000	6.506E-06	9.894E-06	3.275E-05	9.644E-05	3.625E-04	8.944E-04	2.482E-03	7.812E-03	2.368E-02	6.668E-02	1.984E-01
30500	6.678E-06	1.082E-05	3.685E-05	1.074E-04	4.282E-04	9.944E-04	2.712E-03	8.567E-03	2.628E-02	7.184E-02	2.142E-01
31000	6.861E-06	1.187E-05	4.165E-05	1.204E-04	5.042E-04	1.114E-03	2.982E-03	9.382E-03	2.928E-02	7.744E-02	2.318E-01
31500	7.056E-06	1.304E-05	4.725E-05	1.364E-04	5.992E-04	1.264E-03	3.292E-03	1.032E-02	3.268E-02	8.364E-02	2.514E-01
32000	7.264E-06	1.434E-05	5.375E-05	1.564E-04	7.142E-04	1.444E-03	3.642E-03	1.142E-02	3.648E-02	9.044E-02	2.734E-01
32500	7.486E-06	1.578E-05	6.125E-05	1.814E-04	8.542E-04	1.664E-03	4.032E-03	1.262E-02	4.088E-02	9.844E-02	2.984E-01
33000	7.724E-06	1.738E-05	6.985E-05	2.124E-04	1.014E-03	1.924E-03	4.472E-03	1.402E-02	4.592E-02	1.074E-01	3.264E-01
33500	7.978E-06	1.924E-05	7.965E-05	2.504E-04	1.194E-03	2.224E-03	4.962E-03	1.562E-02	5.152E-02	1.184E-01	3.584E-01
34000	8.248E-06	2.138E-05	9.085E-05	2.964E-04	1.414E-03	2.564E-03	5.502E-03	1.742E-02	5.782E-02	1.314E-01	3.944E-01
34500	8.534E-06	2.384E-05	1.044E-04	3.504E-04	1.684E-03	2.944E-03	6.142E-03	1.942E-02	6.482E-02	1.464E-01	4.344E-01
35000	8.838E-06	2.664E-05	1.204E-04	4.144E-04	1.994E-03	3.384E-03	6.882E-03	2.172E-02	7.242E-02	1.634E-01	4.784E-01
35500	9.160E-06	2.984E-05	1.394E-04	4.904E-04	2.344E-03	3.884E-03	7.722E-03	2.432E-02	8.082E-02	1.824E-01	5.264E-01
36000	9.500E-06	3.344E-05	1.614E-04	5.804E-04	2.744E-03	4.444E-03	8.682E-03	2.722E-02	8.982E-02	2.034E-01	5.784E-01
36500	9.860E-06	3.744E-05	1.874E-04	6.844E-04	3.194E-03	5.084E-03	9.682E-03	3.042E-02	9.982E-02	2.264E-01	6.344E-01
37000	1.024E-05	4.184E-05	2.174E-04	8.044E-04	3.694E-03	5.804E-03	1.078E-02	3.382E-02	1.108E-01	2.514E-01	6.944E-01
37500	1.064E-05	4.664E-05	2.514E-04	9.404E-04	4.264E-03	6.624E-03	1.208E-02	3.742E-02	1.238E-01	2.784E-01	7.584E-01
38000	1.106E-05	5.184E-05	2.894E-04	1.094E-03	4.984E-03	7.584E-03	1.368E-02	4.122E-02	1.398E-01	3.084E-01	8.264E-01
38500	1.150E-05	5.744E-05	3.324E-04	1.264E-03	5.864E-03	8.644E-03	1.558E-02	4.542E-02	1.588E-01	3.414E-01	8.984E-01
39000	1.196E-05	6.344E-05	3.814E-04	1.464E-03	6.904E-03	9.844E-03	1.778E-02	5.002E-02	1.808E-01	3.784E-01	9.744E-01
39500	1.244E-05	6.984E-05	4.364E-04	1.694E-03	8.144E-03	1.124E-02	2.038E-02	5.492E-02	2.058E-01	4.194E-01	1.064E-01
40000	1.294E-05	7.664E-05	4.984E-04	1.964E-03	9.544E-03	1.284E-02	2.348E-02	6.012E-02	2.328E-01	4.644E-01	1.164E-01
40500	1.346E-05	8.384E-05	5.684E-04	2.284E-03	1.104E-02	1.464E-02	2.708E-02	6.572E-02	2.628E-01	5.134E-01	1.274E-01
41000	1.400E-05	9.144E-05	6.464E-04	2.654E-03	1.254E-02	1.624E-02	3.028E-02	7.162E-02	2.958E-01	5.664E-01	1.394E-01
41500	1.456E-05	9.944E-05	7.324E-04	3.084E-03	1.414E-02	1.814E-02	3.318E-02	7.782E-02	3.328E-01	6.234E-01	1.524E-01
42000	1.514E-05	1.078E-04	8.284E-04	3.584E-03	1.624E-02	2.034E-02	3.618E-02	8.432E-02	3.748E-01	6.844E-01	1.664E-01
42500	1.574E-05	1.174E-04	9.324E-04	4.144E-03	1.864E-02	2.284E-02	3.938E-02	9.182E-02	4.208E-01	7.494E-01	1.814E-01
43000	1.636E-05	1.284E-04	1.044E-03	4.764E-03	2.134E-02	2.564E-02	4.288E-02	9.972E-02	4.708E-01	8.184E-01	1.974E-01
43500	1.700E-05	1.408E-04	1.174E-03	5.444E-03	2.414E-02	2.864E-02	4.668E-02	1.082E-01	5.248E-01	8.924E-01	2.144E-01
44000	1.766E-05	1.548E-04	1.324E-03	6.184E-03	2.724E-02	3.184E-02	5.088E-02	1.182E-01	5.828E-01	9.724E-01	2.324E-01
44500	1.834E-05	1.704E-04	1.494E-03	7.004E-03	3.064E-02	3.524E-02	5.548E-02	1.298E-01	6.448E-01	1.068E-01	2.514E-01
45000	1.904E-05	1.878E-04	1.684E-03	7.924E-03	3.414E-02	3.884E-02	6.048E-02	1.428E-01	7.108E-01	1.178E-01	2.714E-01
45500	1.976E-05	2.070E-04	1.894E-03	8.964E-03	3.334E-02	4.264E-02	6.588E-02	1.572E-			

150C00	6.809E-05	2.137E-03	9.809E-03	2.137E-03	9.809E-03	2.137E-03	9.809E-03	2.137E-03	9.809E-03
200C00	9.120E-06	2.877E-05	9.079E-04	2.877E-04	9.079E-04	2.877E-04	9.079E-04	2.877E-04	9.079E-04
300C00	1.716E-05	5.283E-05	1.613E-04	4.963E-04	1.543E-04	4.813E-03	1.543E-04	4.813E-03	1.543E-04
400C00	2.402E-05	7.374E-05	2.301E-04	7.470E-04	2.346E-03	7.363E-03	2.297E-02	7.074E-02	2.157E-01
500C00	3.008E-05	9.511E-05	3.007E-04	9.509E-04	3.003E-03	9.488E-03	2.989E-02	9.383E-02	2.939E-01
600C00	3.609E-05	1.141E-04	3.609E-04	1.141E-03	3.609E-03	1.141E-02	3.608E-02	1.140E-01	3.601E-01
800C00	4.812E-05	1.522E-04	4.812E-04	1.522E-03	4.812E-03	1.522E-02	4.812E-02	1.522E-01	4.812E-01
1000C00	6.015E-05	1.902E-04	6.015E-04	1.902E-03	6.015E-03	1.902E-02	6.015E-02	1.902E-01	6.015E-01
1500C00	9.025E-05	2.834E-04	9.024E-04	2.833E-03	9.023E-03	2.833E-02	9.023E-02	2.833E-01	9.023E-01
2000C00	1.204E-04	3.809E-04	1.204E-03	3.808E-03	1.204E-02	3.807E-02	1.204E-01	3.806E-01	1.203E-01
3000C00	1.807E-04	5.713E-04	1.807E-03	5.713E-03	1.807E-02	5.713E-02	1.807E-01	5.713E-01	1.807E-01
4000C00	2.409E-04	7.618E-04	2.409E-03	7.618E-03	2.409E-02	7.618E-02	2.409E-01	7.618E-01	2.409E-01
5000000	3.011E-04	9.522E-04	3.011E-03	9.522E-03	3.011E-02	9.522E-02	3.011E-01	9.522E-01	3.011E-01
6000000	3.613E-04	1.143E-03	3.613E-03	1.143E-02	3.613E-02	1.143E-01	3.613E-01	1.143E-01	3.613E-01
8000C00	4.816E-04	1.524E-03	4.816E-03	1.524E-02	4.816E-02	1.524E-01	4.816E-01	1.524E-01	4.816E-01
9000000	6.022E-04	1.904E-03	6.022E-03	1.904E-02	6.022E-02	1.904E-01	6.022E-01	1.904E-01	6.022E-01

TABLE 103(CONT) PRESSURE (ATM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
10500	2.642E-02	7.909E-02	2.416E-01	7.475E-01	2.324E 00	7.196E 00	2.186E 01	6.433E 01	1.848E 02	5.314E 02
10500	2.940E-02	8.630E-02	2.599E-01	7.948E-01	2.448E 00	7.458E 00	2.350E 01	7.024E 01	2.035E 02	5.822E 02
11000	3.294E-02	9.480E-02	2.808E-01	8.510E-01	2.619E 00	8.115E 00	2.504E 01	7.580E 01	2.225E 02	6.300E 02
11500	3.700E-02	1.047E-01	3.048E-01	9.113E-01	2.780E 00	8.581E 00	2.653E 01	8.102E 01	2.406E 02	6.944E 02
12000	4.144E-02	1.161E-01	3.323E-01	9.790E-01	2.955E 00	9.066E 00	2.800E 01	8.597E 01	2.581E 02	7.517E 02
12500	4.607E-02	1.284E-01	3.635E-01	1.055E 00	3.147E 00	9.579E 00	2.949E 01	9.077E 01	2.749E 02	8.044E 02
13000	5.066E-02	1.421E-01	3.982E-01	1.140E 00	3.357E 00	1.013E 01	3.103E 01	9.550E 01	2.910E 02	8.639E 02
13500	5.502E-02	1.560E-01	4.359E-01	1.234E 00	3.589E 00	1.072E 01	3.263E 01	1.003E 02	3.066E 02	9.178E 02
14000	5.902E-02	1.699E-01	4.761E-01	1.337E 00	3.842E 00	1.135E 01	3.432E 01	1.051E 02	3.219E 02	9.701E 02
14500	6.266E-02	1.833E-01	5.175E-01	1.448E 00	4.119E 00	1.204E 01	3.611E 01	1.101E 02	3.371E 02	1.021E 03
15000	6.597E-02	1.959E-01	5.593E-01	1.565E 00	4.417E 00	1.278E 01	3.800E 01	1.152E 02	3.524E 02	1.071E 03
15500	6.901E-02	2.077E-01	6.005E-01	1.687E 00	4.735E 00	1.358E 01	4.001E 01	1.206E 02	3.679E 02	1.120E 03
16000	7.185E-02	2.185E-01	6.402E-01	1.811E 00	5.071E 00	1.445E 01	4.215E 01	1.262E 02	3.836E 02	1.169E 03
16500	7.455E-02	2.286E-01	6.781E-01	1.935E 00	5.421E 00	1.533E 01	4.441E 01	1.320E 02	3.998E 02	1.217E 03
17000	7.714E-02	2.381E-01	7.139E-01	2.058E 00	5.792E 00	1.627E 01	4.680E 01	1.382E 02	4.165E 02	1.266E 03
17500	7.964E-02	2.471E-01	7.476E-01	2.178E 00	6.149E 00	1.726E 01	4.931E 01	1.446E 02	4.334E 02	1.316E 03
18000	8.215E-02	2.557E-01	7.794E-01	2.294E 00	6.518E 00	1.828E 01	5.194E 01	1.513E 02	4.514E 02	1.366E 03
18500	8.463E-02	2.640E-01	8.096E-01	2.405E 00	6.885E 00	1.933E 01	5.468E 01	1.583E 02	4.697E 02	1.417E 03
19000	8.711E-02	2.721E-01	8.385E-01	2.512E 00	7.248E 00	2.040E 01	5.752E 01	1.654E 02	4.884E 02	1.469E 03
19500	8.963E-02	2.801E-01	8.664E-01	2.614E 00	7.603E 00	2.148E 01	6.045E 01	1.731E 02	5.081E 02	1.521E 03
20000	9.223E-02	2.881E-01	8.934E-01	2.712E 00	7.950E 00	2.257E 01	6.345E 01	1.809E 02	5.283E 02	1.575E 03
20500	9.482E-02	2.961E-01	9.197E-01	2.809E 00	8.298E 00	2.368E 01	6.653E 01	1.891E 02	5.496E 02	1.630E 03
21000	9.741E-02	3.041E-01	9.459E-01	2.905E 00	8.648E 00	2.483E 01	6.971E 01	1.974E 02	5.719E 02	1.686E 03
21500	1.000E-01	3.121E-01	9.721E-01	3.001E 00	8.999E 00	2.603E 01	7.301E 01	2.061E 02	5.952E 02	1.743E 03
22000	1.026E-01	3.201E-01	9.983E-01	3.097E 00	9.351E 00	2.728E 01	7.641E 01	2.152E 02	6.194E 02	1.802E 03
22500	1.052E-01	3.281E-01	1.024E-01	3.193E 00	9.704E 00	2.858E 01	8.000E 01	2.247E 02	6.446E 02	1.862E 03
23000	1.078E-01	3.361E-01	1.050E-01	3.289E 00	1.006E 01	3.000E 01	8.368E 01	2.346E 02	6.708E 02	1.923E 03
23500	1.104E-01	3.441E-01	1.076E-01	3.385E 00	1.040E 01	3.155E 01	8.746E 01	2.449E 02	6.979E 02	1.985E 03
24000	1.130E-01	3.521E-01	1.102E-01	3.481E 00	1.074E 01	3.315E 01	9.134E 01	2.556E 02	7.254E 02	2.048E 03
24500	1.156E-01	3.601E-01	1.128E-01	3.577E 00	1.108E 01	3.480E 01	9.534E 01	2.668E 02	7.544E 02	2.113E 03
25000	1.182E-01	3.681E-01	1.154E-01	3.673E 00	1.142E 01	3.650E 01	9.946E 01	2.784E 02	7.840E 02	2.180E 03
25500	1.208E-01	3.761E-01	1.180E-01	3.769E 00	1.176E 01	3.825E 01	1.037E 02	2.904E 02	8.142E 02	2.249E 03
26000	1.234E-01	3.841E-01	1.206E-01	3.865E 00	1.210E 01	4.005E 01	1.080E 02	3.028E 02	8.450E 02	2.320E 03
26500	1.260E-01	3.921E-01	1.232E-01	3.961E 00	1.244E 01	4.188E 01	1.124E 02	3.156E 02	8.764E 02	2.393E 03
27000	1.286E-01	4.001E-01	1.258E-01	4.057E 00	1.278E 01	4.376E 01	1.169E 02	3.288E 02	9.084E 02	2.468E 03
27500	1.312E-01	4.081E-01	1.284E-01	4.153E 00	1.312E 01	4.568E 01	1.215E 02	3.424E 02	9.409E 02	2.545E 03
28000	1.338E-01	4.161E-01	1.310E-01	4.249E 00	1.346E 01	4.764E 01	1.262E 02	3.564E 02	9.739E 02	2.624E 03
28500	1.364E-01	4.241E-01	1.336E-01	4.345E 00	1.380E 01	4.964E 01	1.310E 02	3.708E 02	1.007E 03	2.705E 03
29000	1.390E-01	4.321E-01	1.362E-01	4.441E 00	1.414E 01	5.168E 01	1.359E 02	3.856E 02	1.039E 03	2.788E 03
29500	1.416E-01	4.401E-01	1.388E-01	4.537E 00	1.448E 01	5.376E 01	1.409E 02	4.008E 02	1.072E 03	2.873E 03
30000	1.442E-01	4.481E-01	1.414E-01	4.633E 00	1.482E 01	5.588E 01	1.460E 02	4.164E 02	1.106E 03	2.960E 03
30500	1.468E-01	4.561E-01	1.440E-01	4.729E 00	1.516E 01	5.804E 01	1.512E 02	4.324E 02	1.141E 03	3.049E 03
31000	1.494E-01	4.641E-01	1.466E-01	4.825E 00	1.550E 01	6.024E 01	1.565E 02	4.488E 02	1.177E 03	3.140E 03
31500	1.520E-01	4.721E-01	1.492E-01	4.921E 00	1.584E 01	6.248E 01	1.619E 02	4.656E 02	1.214E 03	3.233E 03
32000	1.546E-01	4.801E-01	1.518E-01	5.017E 00	1.618E 01	6.476E 01	1.674E 02	4.828E 02	1.252E 03	3.328E 03
32500	1.572E-01	4.881E-01	1.544E-01	5.113E 00	1.652E 01	6.708E 01	1.730E 02	5.004E 02	1.291E 03	3.425E 03
33000	1.598E-01	4.961E-01	1.570E-01	5.209E 00	1.686E 01	6.944E 01	1.787E 02	5.184E 02	1.331E 03	3.524E 03
33500	1.624E-01	5.041E-01	1.596E-01	5.305E 00	1.720E 01	7.184E 01	1.845E 02	5.368E 02	1.372E 03	3.625E 03
34000	1.650E-01	5.121E-01	1.622E-01	5.401E 00	1.754E 01	7.428E 01	1.907E 02	5.556E 02	1.414E 03	3.728E 03
34500	1.676E-01	5.201E-01	1.648E-01	5.497E 00	1.788E 01	7.676E 01	1.970E 02	5.748E 02	1.457E 03	3.833E 03
35000	1.702E-01	5.281E-01	1.674E-01	5.593E 00	1.822E 01	7.928E 01	2.034E 02	5.944E 02	1.501E 03	3.940E 03
35500	1.728E-01	5.361E-01	1.700E-01	5.689E 00	1.856E 01	8.184E 01	2.100E 02	6.144E 02	1.546E 03	4.049E 03
36000	1.754E-01	5.441E-01	1.726E-01	5.785E 00	1.890E 01	8.444E 01	2.167E 02	6.348E 02	1.592E 03	4.160E 03
36500	1.780E-01	5.521E-01	1.752E-01	5.881E 00	1.924E 01	8.708E 01	2.235E 02	6.556E 02	1.639E 03	4.273E 03
37000	1.806E-01	5.601E-01	1.778E-01	5.977E 00	1.958E 01	8.976E 01	2.304E 02	6.768E 02	1.688E 03	4.388E 03
37500	1.832E-01	5.681E-01	1.804E-01	6.073E 00	1.992E 01	9.248E 01	2.374E 02	6.984E 02	1.738E 03	4.505E 03
38000	1.858E-01	5.761E-01	1.830E-01	6.169E 00	2.026E 01	9.524E 01	2.445E 02	7.204E 02	1.789E 03	4.624E 03
38500	1.884E-01	5.841E-01	1.856E-01	6.265E 00	2.060E 01	9.804E 01	2.517E 02	7.438E 02	1.841E 03	4.745E 03
39000	1.910E-01	5.921E-01	1.882E-01	6.361E 00	2.094E 01	1.008E 02	2.591E 02	7.676E 02	1.894E 03	4.868E 03
39500	1.936E-01	6.001E-01	1.908E-01	6.457E 00	2.128E 01	1.038E 02	2.666E 02	7.918E 02	1.948E 03	4.993E 03
40000	1.962E-01	6.081E-01	1.934E-01	6.553E 00	2.162E 01	1.068E 02	2.742E 02	8.164E 02	2.003E 03	5.120E 03
40500	1.988E-01	6.161E-01	1.960E-01	6.649E 00	2.196E 01	1.098E 02	2.818E 02	8.414E 02	2.059E 03	5.249E 03
41000	2.014E-01	6.241E-01	1.986E-01	6.745E 00	2.230E 01	1.128E 02	2.895E 02	8.668E 02	2.116E 03	5.380E 03
41500	2.040E-01	6.321E-01	2.012E-01	6.841E 00	2.264E 01	1.158E 02	2.973E 02	8.926E 02	2.174E 03	5.513E 03
42000	2.066E-01	6.401E-01	2.038E-01	6.937E 00	2.298E 01	1.188E 02	3.052E 02	9.188E 02	2.233E 03	5.648E 03
42500	2.092E-01	6.481E-01	2.064E-01	7.033E 00	2.332E 01	1.218E 02	3.132E 02	9.454E 02	2.293E 03	5.785E 03
43000	2.118E-01	6.561E-01	2.090E-01	7.129E 00	2.366E 01	1.248E 02	3.213E 02	9.724E 02	2.354E 03	5.924E 03
43500	2.144E-01	6.641E-01	2.116E-01	7.225E 00	2.400E 01	1.278E 02	3.295E 02	1.000E 03	2.416E 03	6.065E 03
44000	2.170E-01	6.721E-01	2.142E-01	7.321E 00	2.434E 01	1.308E 02	3.378E 02	1.028E 03	2.479E 03	6.208E 03
44500	2.196E-01	6.801E-01	2.168E-01	7.417E 00	2.468E 01	1.338E 02	3.462E 02	1.056E 03	2.543E 03	6.353E 03
45000	2.222E-01	6.881E-01	2.194E-01	7.513E 00	2.502E 01	1.368E 02	3.547E 02	1.084E 03	2.608E 03	6.500E 03
45500	2.248E-01	6.961E-01	2.220E-01	7.609E 00	2.536E 01	1.398E 02	3.633E 02	1.112E 03	2.674E 03	6.649E 03
46000	2.274E-01	7.041E-01	2.246E-01	7.705E 00	2.570E 01	1.428E 02	3.720E 02	1.140E 03	2.741E 03	6.800E 03
46500	2.300E-01	7.121E-01	2.272E-01	7.801E 00	2.604E 01	1.458E 02	3.808E 02	1.168E 03	2.809E 03	6.953E 03
47000	2.326E-01	7.201E-01	2.298E-01	7.897E 00	2.638E 01	1.488E 02	3.897E 02	1.196E 03	2.878E 03	7.108E 03
47500	2.352E-01	7.281E-01	2.324E-01	7.993E 00	2.672E 01	1.518E 02	3.987E 02	1.224E 03	2.948E 03	7.265E 03
48000	2.378E-01	7.361E-01	2.350E-01	8.089E 00	2.706E 01	1.548E 02	4.078E 02	1.252E 03	3.019E 03	7.424E 03
48500	2.404E-01	7.441E-01	2.376E-01	8.185E 00	2.740E 01	1.578E 02	4.170E 02	1.280E 03	3.091E 03	7.585E 03
49000	2.430E-01	7.521E-01	2.402E-01	8.281E 00	2.774E 01	1.608E 02	4.263E 02	1.		

200000	2.861E 00	5.026E 00	2.840E 01	8.897E 01	2.761E 02	8.437E 02	2.523E 03	7.354E 03	2.088E 04	5.773E 04
300000	4.306E 00	1.359E 01	4.285E 01	1.349E 02	4.236E 02	1.322E 03	4.081E 03	1.238E 04	3.661E 04	1.050E 05
400000	6.293E 00	1.925E 01	5.896E 01	1.827E 02	5.708E 02	1.785E 03	5.558E 03	1.713E 04	5.185E 04	1.330E 05
500000	8.752E 00	2.662E 01	8.135E 01	2.493E 02	7.595E 02	2.314E 03	7.104E 03	2.189E 04	6.687E 04	2.004E 05
600000	1.114E 01	3.468E 01	1.069E 02	3.250E 02	9.853E 02	2.995E 03	9.065E 03	2.737E 04	8.279E 04	2.492E 05
800000	1.520E 01	4.797E 01	1.510E 02	4.726E 02	1.469E 03	4.517E 03	1.369E 04	4.104E 04	1.225E 05	3.629E 05
1000000	1.901E 01	6.010E 01	1.899E 02	5.992E 02	1.886E 03	5.903E 03	1.830E 04	5.594E 04	1.681E 05	4.977E 05
1500000	2.853E 01	9.019E 01	2.851E 02	9.011E 02	2.846E 03	8.981E 03	2.828E 04	8.870E 04	2.760E 05	8.465E 05
2000000	3.804E 01	1.203E 02	3.803E 02	1.202E 03	3.798E 03	1.200E 04	3.785E 04	1.192E 05	3.732E 05	1.164E 06
3000000	5.712E 01	1.804E 02	5.709E 02	1.804E 03	5.703E 03	1.802E 04	5.691E 04	1.796E 05	5.655E 05	1.775E 06
4000000	7.617E 01	2.409E 02	7.616E 02	2.408E 03	7.613E 03	2.404E 04	7.600E 04	2.399E 05	7.566E 05	2.381E 06
5000000	9.522E 01	3.011E 02	9.521E 02	3.010E 03	9.518E 03	3.009E 04	9.509E 04	3.004E 05	9.479E 05	2.987E 06
6000000	1.143E 02	3.613E 02	1.143E 03	3.613E 03	1.142E 04	3.611E 04	1.142E 05	3.607E 05	1.139E 06	3.592E 06
8000000	1.524E 02	4.818E 02	1.523E 03	4.817E 03	1.523E 04	4.816E 04	1.523E 05	4.812E 05	1.520E 06	4.800E 06
10000000	1.904E 02	6.022E 02	1.904E 03	6.022E 03	1.904E 04	6.021E 04	1.904E 05	6.017E 05	1.902E 06	6.006E 06

TABLE 104. LOG OF PRESSURE (ATM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
10000	-6.836E 00	-6.336E 00	-5.837E 00	-5.337E 00	-4.839E 00	-4.345E 00	-3.860E 00	-3.391E 00	-2.940E 00	-2.495E 00	-2.042E 00
10500	-6.815E 00	-6.315E 00	-5.815E 00	-5.316E 00	-4.816E 00	-4.319E 00	-3.822E 00	-3.345E 00	-2.882E 00	-2.433E 00	-1.987E 00
11000	-6.795E 00	-6.295E 00	-5.795E 00	-5.295E 00	-4.796E 00	-4.297E 00	-3.800E 00	-3.311E 00	-2.835E 00	-2.377E 00	-1.931E 00
11500	-6.774E 00	-6.275E 00	-5.776E 00	-5.276E 00	-4.776E 00	-4.277E 00	-3.779E 00	-3.284E 00	-2.799E 00	-2.330E 00	-1.878E 00
12000	-6.752E 00	-6.256E 00	-5.757E 00	-5.257E 00	-4.757E 00	-4.258E 00	-3.759E 00	-3.262E 00	-2.770E 00	-2.291E 00	-1.830E 00
12500	-6.726E 00	-6.235E 00	-5.730E 00	-5.239E 00	-4.739E 00	-4.240E 00	-3.740E 00	-3.242E 00	-2.747E 00	-2.261E 00	-1.790E 00
13000	-6.699E 00	-6.209E 00	-5.718E 00	-5.221E 00	-4.722E 00	-4.222E 00	-3.723E 00	-3.224E 00	-2.727E 00	-2.236E 00	-1.757E 00
13500	-6.666E 00	-6.176E 00	-5.694E 00	-5.202E 00	-4.705E 00	-4.206E 00	-3.706E 00	-3.207E 00	-2.709E 00	-2.215E 00	-1.729E 00
14000	-6.600E 00	-6.136E 00	-5.665E 00	-5.180E 00	-4.682E 00	-4.189E 00	-3.690E 00	-3.191E 00	-2.692E 00	-2.196E 00	-1.704E 00
14500	-6.559E 00	-6.092E 00	-5.628E 00	-5.154E 00	-4.667E 00	-4.172E 00	-3.674E 00	-3.175E 00	-2.676E 00	-2.179E 00	-1.686E 00
15000	-6.525E 00	-6.052E 00	-5.588E 00	-5.122E 00	-4.644E 00	-4.154E 00	-3.656E 00	-3.140E 00	-2.641E 00	-2.163E 00	-1.668E 00
15500	-6.497E 00	-6.018E 00	-5.548E 00	-5.085E 00	-4.616E 00	-4.134E 00	-3.642E 00	-3.145E 00	-2.646E 00	-2.148E 00	-1.652E 00
16000	-6.472E 00	-5.989E 00	-5.513E 00	-5.047E 00	-4.584E 00	-4.110E 00	-3.624E 00	-3.130E 00	-2.632E 00	-2.134E 00	-1.637E 00
16500	-6.452E 00	-5.964E 00	-5.483E 00	-5.012E 00	-4.549E 00	-4.082E 00	-3.604E 00	-3.114E 00	-2.618E 00	-2.120E 00	-1.622E 00
17000	-6.435E 00	-5.942E 00	-5.457E 00	-4.981E 00	-4.514E 00	-4.052E 00	-3.580E 00	-3.096E 00	-2.603E 00	-2.106E 00	-1.608E 00
17500	-6.420E 00	-5.924E 00	-5.435E 00	-4.954E 00	-4.482E 00	-4.019E 00	-3.554E 00	-3.077E 00	-2.588E 00	-2.092E 00	-1.595E 00
18000	-6.406E 00	-5.909E 00	-5.416E 00	-4.930E 00	-4.454E 00	-3.987E 00	-3.525E 00	-3.055E 00	-2.571E 00	-2.078E 00	-1.582E 00
18500	-6.393E 00	-5.895E 00	-5.400E 00	-4.910E 00	-4.429E 00	-3.958E 00	-3.495E 00	-3.030E 00	-2.553E 00	-2.064E 00	-1.569E 00
19000	-6.381E 00	-5.882E 00	-5.385E 00	-4.892E 00	-4.407E 00	-3.931E 00	-3.468E 00	-3.004E 00	-2.533E 00	-2.048E 00	-1.556E 00
19500	-6.369E 00	-5.870E 00	-5.372E 00	-4.872E 00	-4.387E 00	-3.907E 00	-3.438E 00	-2.974E 00	-2.510E 00	-2.032E 00	-1.542E 00
20000	-6.356E 00	-5.856E 00	-5.360E 00	-4.863E 00	-4.371E 00	-3.886E 00	-3.413E 00	-2.949E 00	-2.486E 00	-2.014E 00	-1.528E 00
22000	-6.290E 00	-5.806E 00	-5.314E 00	-4.817E 00	-4.319E 00	-3.824E 00	-3.335E 00	-2.856E 00	-2.388E 00	-1.928E 00	-1.461E 00
24000	-6.200E 00	-5.727E 00	-5.253E 00	-4.769E 00	-4.270E 00	-3.780E 00	-3.284E 00	-2.793E 00	-2.311E 00	-1.841E 00	-1.380E 00
26000	-6.134E 00	-5.650E 00	-5.173E 00	-4.702E 00	-4.223E 00	-3.738E 00	-3.244E 00	-2.746E 00	-2.256E 00	-1.773E 00	-1.303E 00
28000	-6.091E 00	-5.596E 00	-5.108E 00	-4.629E 00	-4.157E 00	-3.684E 00	-3.201E 00	-2.712E 00	-2.216E 00	-1.725E 00	-1.243E 00
30000	-6.056E 00	-5.559E 00	-5.064E 00	-4.574E 00	-4.092E 00	-3.619E 00	-3.147E 00	-2.668E 00	-2.179E 00	-1.687E 00	-1.197E 00
32000	-6.018E 00	-5.524E 00	-5.030E 00	-4.534E 00	-4.043E 00	-3.561E 00	-3.087E 00	-2.612E 00	-2.122E 00	-1.631E 00	-1.140E 00
34000	-5.985E 00	-5.485E 00	-4.997E 00	-4.503E 00	-4.008E 00	-3.516E 00	-3.034E 00	-2.561E 00	-2.090E 00	-1.613E 00	-1.126E 00
36000	-5.911E 00	-5.433E 00	-4.935E 00	-4.469E 00	-3.977E 00	-3.483E 00	-2.993E 00	-2.511E 00	-2.035E 00	-1.569E 00	-1.091E 00
38000	-5.869E 00	-5.384E 00	-4.905E 00	-4.428E 00	-3.944E 00	-3.453E 00	-2.960E 00	-2.472E 00	-1.992E 00	-1.522E 00	-1.051E 00
40000	-5.838E 00	-5.344E 00	-4.860E 00	-4.391E 00	-3.904E 00	-3.421E 00	-2.931E 00	-2.440E 00	-1.953E 00	-1.477E 00	-1.008E 00
42000	-5.807E 00	-5.314E 00	-4.825E 00	-4.353E 00	-3.861E 00	-3.384E 00	-2.901E 00	-2.412E 00	-1.922E 00	-1.439E 00	-0.961E-01
44000	-5.772E 00	-5.286E 00	-4.796E 00	-4.303E 00	-3.821E 00	-3.344E 00	-2.867E 00	-2.383E 00	-1.894E 00	-1.407E 00	-0.928E-01
46000	-5.735E 00	-5.253E 00	-4.767E 00	-4.277E 00	-3.788E 00	-3.306E 00	-2.829E 00	-2.352E 00	-1.867E 00	-1.379E 00	-0.895E-01
48000	-5.701E 00	-5.217E 00	-4.736E 00	-4.250E 00	-3.760E 00	-3.273E 00	-2.793E 00	-2.317E 00	-1.838E 00	-1.353E 00	-0.871E-01
50000	-5.673E 00	-5.189E 00	-4.702E 00	-4.220E 00	-3.734E 00	-3.246E 00	-2.761E 00	-2.283E 00	-1.807E 00	-1.327E 00	-0.844E-01
60000	-5.578E 00	-5.080E 00	-4.583E 00	-4.088E 00	-3.598E 00	-3.114E 00	-2.634E 00	-2.153E 00	-1.667E 00	-1.186E 00	-0.710E-01
70000	-5.499E 00	-5.001E 00	-4.505E 00	-4.009E 00	-3.513E 00	-3.017E 00	-2.524E 00	-2.037E 00	-1.557E 00	-1.078E 00	-0.5976E-01
80000	-5.440E 00	-4.940E 00	-4.441E 00	-3.942E 00	-3.445E 00	-2.949E 00	-2.454E 00	-1.959E 00	-1.467E 00	-0.9813E-01	-5.027E-01

90000	-5.309E 00	-4.809E 00	-4.309E 00	-3.809E 00	-3.309E 00	-2.809E 00	-2.309E 00	-1.809E 00	-1.404E 00	-9.105E-01	-4.221E-01
100000	-5.343E 00	-4.843E 00	-4.343E 00	-3.843E 00	-3.343E 00	-2.844E 00	-2.344E 00	-1.844E 00	-1.350E 00	-8.555E-01	-3.627E-01
110000	-5.167E 00	-4.667E 00	-4.167E 00	-3.667E 00	-3.167E 00	-2.667E 00	-2.167E 00	-1.667E 00	-1.167E 00	-6.478E-01	-1.605E-01
120000	-5.040E 00	-4.540E 00	-4.042E 00	-3.542E 00	-3.042E 00	-2.542E 00	-2.042E 00	-1.542E 00	-1.042E 00	-5.426E-01	-4.288E-02
130000	-4.703E 00	-4.277E 00	-3.792E 00	-3.304E 00	-2.812E 00	-2.318E 00	-1.827E 00	-1.340E 00	-8.533E-01	-3.411E-01	1.356E-01
140000	-4.619E 00	-4.121E 00	-3.623E 00	-3.127E 00	-2.630E 00	-2.133E 00	-1.639E 00	-1.15CE 00	-6.641E-01	-1.801E-01	3.098E-01
150000	-4.522E 00	-4.022E 00	-3.522E 00	-3.022E 00	-2.522E 00	-2.023E 00	-1.524E 00	-1.028E 00	-5.317E-01	-3.641E-02	4.558E-01
160000	-4.443E 00	-3.943E 00	-3.443E 00	-2.943E 00	-2.443E 00	-1.943E 00	-1.443E 00	-9.429E-01	-4.435E-01	5.486E-02	5.516E-01
170000	-4.318E 00	-3.818E 00	-3.318E 00	-2.818E 00	-2.318E 00	-1.818E 00	-1.318E 00	-8.177E-01	-3.177E-01	1.822E-01	6.821E-01
180000	-4.221E 00	-3.721E 00	-3.221E 00	-2.721E 00	-2.221E 00	-1.721E 00	-1.221E 00	-7.208E-01	-2.208E-01	2.792E-01	7.792E-01
190000	-4.049E 00	-3.549E 00	-3.049E 00	-2.549E 00	-2.049E 00	-1.549E 00	-1.049E 00	-5.444E-01	-4.444E-02	4.533E-01	9.533E-01
200000	-3.919E 00	-3.419E 00	-2.919E 00	-2.419E 00	-1.919E 00	-1.419E 00	-9.195E-01	-4.196E-01	8.035E-02	5.803E-01	1.803E 00
210000	-3.749E 00	-3.249E 00	-2.749E 00	-2.249E 00	-1.749E 00	-1.249E 00	-7.431E-01	-2.431E-01	2.549E-01	7.549E-01	1.257E 00
220000	-3.618E 00	-3.118E 00	-2.618E 00	-2.118E 00	-1.618E 00	-1.118E 00	-6.182E-01	-1.182E-01	3.818E-01	8.818E-01	1.382E 00
230000	-3.521E 00	-3.021E 00	-2.521E 00	-2.021E 00	-1.521E 00	-1.021E 00	-5.213E-01	-2.127E-02	4.787E-01	9.787E-01	1.479E 00
240000	-3.442E 00	-2.942E 00	-2.442E 00	-1.942E 00	-1.442E 00	-9.421E-01	-4.421E-01	5.791E-02	5.379E-01	1.038E 00	1.958E 00
250000	-3.317E 00	-2.817E 00	-2.317E 00	-1.817E 00	-1.317E 00	-8.171E-01	-3.171E-01	1.829E-01	4.829E-01	1.182E 00	1.482E 00
260000	-3.220E 00	-2.720E 00	-2.220E 00	-1.720E 00	-1.220E 00	-7.202E-01	-2.202E-01	2.798E-01	7.798E-01	1.298E 00	1.798E 00

TABLE 104(CONT): LOG OF PRESSURE (ATM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
1000	-1.570E-00	-1.102E-00	-6.169E-01	-1.264E-01	3.663E-01	0.571E-01	1.340E-00	1.808E-00	2.267E-00	2.725E-00
1050	-1.532E-00	-1.044E-00	-5.852E-01	-9.843E-02	3.924E-01	0.841E-01	1.371E-00	1.847E-00	2.309E-00	2.766E-00
1100	-1.482E-00	-1.023E-00	-5.517E-01	-7.007E-02	4.181E-01	9.093E-01	1.399E-00	1.880E-00	2.347E-00	2.805E-00
1150	-1.432E-00	-9.800E-01	-5.140E-01	-4.033E-02	4.441E-01	9.335E-01	1.424E-00	1.909E-00	2.381E-00	2.842E-00
1200	-1.383E-00	-9.333E-01	-4.785E-01	-9.232E-03	4.706E-01	9.574E-01	1.447E-00	1.934E-00	2.412E-00	2.876E-00
1250	-1.337E-00	-8.906E-01	-4.395E-01	2.323E-02	4.978E-01	9.813E-01	1.470E-00	1.958E-00	2.439E-00	2.908E-00
1300	-1.295E-00	-8.473E-01	-3.999E-01	5.687E-02	5.240E-01	1.006E-01	1.492E-00	1.980E-00	2.464E-00	2.936E-00
1350	-1.240E-00	-8.048E-01	-3.604E-01	9.132E-02	5.549E-01	1.030E-00	1.514E-00	2.001E-00	2.487E-00	2.963E-00
1400	-1.229E-00	-7.698E-01	-3.223E-01	1.261E-01	5.846E-01	1.055E-00	1.536E-00	2.022E-00	2.508E-00	2.987E-00
1450	-1.203E-00	-7.368E-01	-2.861E-01	1.607E-01	6.147E-01	1.081E-00	1.558E-00	2.042E-00	2.528E-00	3.009E-00
1500	-1.181E-00	-7.079E-01	-2.523E-01	1.945E-01	6.451E-01	1.107E-00	1.580E-00	2.062E-00	2.547E-00	3.030E-00
1550	-1.161E-00	-6.826E-01	-2.215E-01	2.279E-01	6.753E-01	1.133E-00	1.602E-00	2.081E-00	2.566E-00	3.049E-00
1600	-1.144E-00	-6.605E-01	-1.937E-01	2.578E-01	7.051E-01	1.159E-00	1.625E-00	2.101E-00	2.584E-00	3.068E-00
1650	-1.128E-00	-6.408E-01	-1.687E-01	2.868E-01	7.341E-01	1.185E-00	1.647E-00	2.121E-00	2.602E-00	3.085E-00
1700	-1.113E-00	-6.232E-01	-1.444E-01	3.135E-01	7.621E-01	1.211E-00	1.670E-00	2.140E-00	2.620E-00	3.103E-00
1750	-1.095E-00	-6.072E-01	-1.263E-01	3.381E-01	7.888E-01	1.237E-00	1.693E-00	2.160E-00	2.637E-00	3.119E-00
1800	-1.085E-00	-5.923E-01	-1.082E-01	3.604E-01	8.141E-01	1.262E-00	1.715E-00	2.180E-00	2.655E-00	3.135E-00
1850	-1.072E-00	-5.784E-01	-9.170E-02	3.812E-01	8.379E-01	1.286E-00	1.738E-00	2.199E-00	2.672E-00	3.151E-00
1900	-1.060E-00	-5.653E-01	-7.648E-02	4.000E-01	8.602E-01	1.310E-00	1.760E-00	2.219E-00	2.689E-00	3.167E-00
1950	-1.048E-00	-5.524E-01	-6.229E-02	4.173E-01	8.810E-01	1.332E-00	1.781E-00	2.238E-00	2.706E-00	3.182E-00
2000	-1.035E-00	-5.404E-01	-4.895E-02	4.335E-01	9.003E-01	1.353E-00	1.802E-00	2.257E-00	2.723E-00	3.197E-00
2200	-9.821E-01	-4.930E-01	-9.161E-04	4.879E-01	9.656E-01	1.429E-00	1.880E-00	2.331E-00	2.789E-00	3.254E-00
2400	-9.167E-01	-4.415E-01	4.418E-02	5.330E-01	1.017E-00	1.489E-00	1.947E-00	2.398E-00	2.851E-00	3.311E-00
2600	-8.427E-01	-3.805E-01	9.273E-02	5.759E-01	1.061E-00	1.538E-00	2.003E-00	2.457E-00	2.908E-00	3.363E-00
2800	-7.738E-01	-3.141E-01	1.480E-01	6.208E-01	1.102E-00	1.581E-00	2.051E-00	2.510E-00	2.960E-00	3.411E-00
3000	-7.176E-01	-2.514E-01	2.073E-01	6.702E-01	1.143E-00	1.621E-00	2.094E-00	2.556E-00	3.004E-00	3.454E-00
3200	-6.736E-01	-1.982E-01	2.645E-01	7.228E-01	1.187E-00	1.659E-00	2.132E-00	2.597E-00	3.049E-00	3.497E-00
3400	-6.376E-01	-1.549E-01	3.152E-01	7.744E-01	1.233E-00	1.699E-00	2.169E-00	2.635E-00	3.088E-00	3.536E-00
3600	-6.049E-01	-1.190E-01	3.582E-01	8.224E-01	1.279E-00	1.739E-00	2.205E-00	2.671E-00	3.124E-00	3.572E-00
3800	-5.719E-01	-8.701E-02	3.946E-01	8.648E-01	1.324E-00	1.780E-00	2.241E-00	2.705E-00	3.159E-00	3.605E-00
4000	-5.361E-01	-5.605E-02	4.265E-01	9.019E-01	1.365E-00	1.820E-00	2.278E-00	2.738E-00	3.191E-00	3.637E-00
4200	-4.977E-01	-2.391E-02	4.563E-01	9.343E-01	1.402E-00	1.859E-00	2.314E-00	2.771E-00	3.222E-00	3.668E-00
4400	-4.587E-01	1.022E-02	4.858E-01	9.639E-01	1.435E-00	1.895E-00	2.349E-00	2.803E-00	3.253E-00	3.697E-00
4600	-4.219E-01	4.555E-02	5.162E-01	9.920E-01	1.465E-00	1.928E-00	2.383E-00	2.835E-00	3.283E-00	3.726E-00
4800	-3.887E-01	8.044E-02	5.476E-01	1.020E-00	1.493E-00	1.958E-00	2.415E-00	2.864E-00	3.312E-00	3.753E-00
5000	-3.593E-01	1.133E-01	5.796E-01	1.049E-00	1.520E-00	1.987E-00	2.445E-00	2.896E-00	3.341E-00	3.780E-00
6000	-2.369E-01	4.409E-01	7.179E-01	1.187E-00	1.649E-00	2.111E-00	2.572E-00	3.027E-00	3.472E-00	3.907E-00
7000	-1.190E-01	3.537E-01	8.243E-01	1.296E-00	1.764E-00	2.225E-00	2.681E-00	3.135E-00	3.582E-00	4.017E-00
8000	-2.594E-02	4.512E-01	9.241E-01	1.392E-00	1.858E-00	2.322E-00	2.779E-00	3.231E-00	3.677E-00	4.113E-00

96CC00	9.842E-02	9.335E-01	1.008E 00	1.478E 00	1.944E 00	2.405E 00	2.843E 00	3.314E 00	3.762E 00	4.197E 00
10CC00	1.262E-01	6.073E-01	1.081E 00	1.552E 00	2.020E 00	2.481E 00	2.938E 00	3.391E 00	3.838E 00	4.273E 00
150C00	3.300E-01	8.267E-01	1.320E 00	1.808E 00	2.289E 00	2.761E 00	3.223E 00	3.677E 00	4.125E 00	4.562E 00
250C00	4.546E-01	9.555E-01	1.453E 00	1.949E 00	2.441E 00	2.926E 00	3.402E 00	3.867E 00	4.320E 00	4.761E 00
36CC00	6.341E-01	1.133E 00	1.632E 00	2.130E 00	2.627E 00	3.121E 00	3.611E 00	4.093E 00	4.564E 00	5.021E 00
480C00	7.989E-01	1.284E 00	1.771E 00	2.262E 00	2.756E 00	3.252E 00	3.745E 00	4.234E 00	4.715E 00	5.185E 00
50CC00	9.421E-01	1.425E 00	1.910E 00	2.397E 00	2.881E 00	3.364E 00	3.852E 00	4.340E 00	4.825E 00	5.302E 00
60CC00	1.047E 00	1.540E 00	2.024E 00	2.512E 00	2.994E 00	3.476E 00	3.957E 00	4.437E 00	4.918E 00	5.396E 00
80CC00	1.102E 00	1.681E 00	2.179E 00	2.675E 00	3.167E 00	3.655E 00	4.136E 00	4.613E 00	5.088E 00	5.568E 00
100CC00	1.279E 00	1.779E 00	2.270E 00	2.770E 00	3.276E 00	3.771E 00	4.262E 00	4.748E 00	5.226E 00	5.697E 00
130CC00	1.455E 00	1.955E 00	2.455E 00	2.955E 00	3.454E 00	3.953E 00	4.451E 00	4.948E 00	5.441E 00	5.928E 00
250CC00	1.580E 00	2.080E 00	2.580E 00	3.080E 00	3.580E 00	4.079E 00	4.578E 00	5.076E 00	5.573E 00	6.068E 00
300CC00	1.757E 00	2.257E 00	2.757E 00	3.256E 00	3.754E 00	4.254E 00	4.753E 00	5.254E 00	5.752E 00	6.249E 00
400CC00	1.882E 00	2.382E 00	2.882E 00	3.382E 00	3.882E 00	4.381E 00	4.881E 00	5.380E 00	5.879E 00	6.377E 00
500CC00	1.979E 00	2.479E 00	2.979E 00	3.479E 00	3.979E 00	4.478E 00	4.978E 00	5.478E 00	5.977E 00	6.475E 00
6000000	2.058E 00	2.558E 00	3.058E 00	3.558E 00	4.058E 00	4.558E 00	5.057E 00	5.557E 00	6.056E 00	6.555E 00
8000000	2.183E 00	2.683E 00	3.183E 00	3.683E 00	4.183E 00	4.683E 00	5.183E 00	5.682E 00	6.182E 00	6.681E 00
10000000	2.280E 00	2.780E 00	3.280E 00	3.780E 00	4.280E 00	4.780E 00	5.280E 00	5.779E 00	6.279E 00	6.779E 00

TABLE 105. DIMENSIONLESS INTERNAL ENERGY, E/RT, OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
10000	4.954E 01	4.952E 01	4.949E 01	4.939E 01	4.908E 01	4.818E 01	4.583E 01	4.109E 01	3.444E 01	2.781E 01	2.262E 01
10500	4.752E 01	4.750E 01	4.749E 01	4.744E 01	4.731E 01	4.692E 01	4.580E 01	4.303E 01	3.792E 01	3.139E 01	2.534E 01
11000	4.576E 01	4.569E 01	4.566E 01	4.543E 01	4.557E 01	4.539E 01	4.486E 01	4.282E 01	4.003E 01	3.453E 01	2.827E 01
11500	4.436E 01	4.409E 01	4.401E 01	4.397E 01	4.393E 01	4.385E 01	4.358E 01	4.282E 01	4.083E 01	3.678E 01	3.102E 01
12000	4.372E 01	4.286E 01	4.256E 01	4.247E 01	4.242E 01	4.237E 01	4.223E 01	4.183E 01	4.069E 01	3.799E 01	3.327E 01
12500	4.466E 01	4.230E 01	4.144E 01	4.114E 01	4.104E 01	4.099E 01	4.091E 01	4.069E 01	4.004E 01	3.834E 01	3.481E 01
13000	4.818E 01	4.308E 01	4.090E 01	4.010E 01	3.982E 01	3.972E 01	3.945E 01	3.952E 01	3.914E 01	3.810E 01	3.562E 01
13500	5.431E 01	4.599E 01	4.143E 01	3.952E 01	3.882E 01	3.859E 01	3.844E 01	3.839E 01	3.816E 01	3.752E 01	3.585E 01
14000	6.131E 01	5.108E 01	4.363E 01	3.977E 01	3.819E 01	3.743E 01	3.743E 01	3.732E 01	3.717E 01	3.676E 01	3.566E 01
14500	6.711E 01	5.724E 01	4.769E 01	4.128E 01	3.816E 01	3.696E 01	3.651E 01	3.634E 01	3.621E 01	3.594E 01	3.520E 01
15000	7.103E 01	6.283E 01	5.293E 01	4.431E 01	3.904E 01	3.646E 01	3.578E 01	3.546E 01	3.530E 01	3.510E 01	3.460E 01
15500	7.356E 01	6.595E 01	5.818E 01	4.356E 01	4.113E 01	3.708E 01	3.534E 01	3.471E 01	3.447E 01	3.428E 01	3.393E 01
16000	7.502E 01	6.974E 01	6.246E 01	5.326E 01	4.435E 01	3.831E 01	3.533E 01	3.416E 01	3.373E 01	3.351E 01	3.324E 01
16500	7.539E 01	7.151E 01	6.557E 01	5.755E 01	4.828E 01	4.052E 01	3.593E 01	3.389E 01	3.311E 01	3.280E 01	3.255E 01
17000	7.484E 01	7.231E 01	6.768E 01	6.096E 01	5.230E 01	4.353E 01	3.725E 01	3.400E 01	3.268E 01	3.217E 01	3.190E 01
17500	7.374E 01	7.222E 01	6.892E 01	6.345E 01	5.586E 01	4.697E 01	3.930E 01	3.462E 01	3.248E 01	3.165E 01	3.129E 01
18000	7.239E 01	7.148E 01	6.934E 01	6.513E 01	5.871E 01	5.040E 01	4.194E 01	3.591E 01	3.260E 01	3.127E 01	3.074E 01
18500	7.099E 01	7.039E 01	6.906E 01	6.606E 01	6.083E 01	5.344E 01	4.488E 01	3.758E 01	3.312E 01	3.109E 01	3.028E 01
19000	6.967E 01	6.917E 01	6.831E 01	6.631E 01	6.227E 01	5.594E 01	4.781E 01	3.977E 01	3.408E 01	3.115E 01	2.993E 01
19500	6.852E 01	6.793E 01	6.731E 01	6.608E 01	6.304E 01	5.784E 01	5.048E 01	4.223E 01	3.547E 01	3.150E 01	2.973E 01
20000	6.769E 01	6.680E 01	6.623E 01	6.533E 01	6.329E 01	5.917E 01	5.275E 01	4.474E 01	3.722E 01	3.219E 01	2.970E 01
20500	6.699E 01	6.566E 01	6.488E 01	6.373E 01	6.099E 01	5.908E 01	5.719E 01	5.230E 01	4.533E 01	3.778E 01	3.187E 01
21000	6.625E 01	6.455E 01	6.358E 01	6.089E 01	5.837E 01	5.723E 01	5.622E 01	5.429E 01	5.040E 01	4.427E 01	3.712E 01
21500	6.550E 01	6.345E 01	6.222E 01	5.911E 01	5.601E 01	5.598E 01	5.414E 01	5.249E 01	5.127E 01	4.784E 01	4.223E 01
22000	6.479E 01	6.240E 01	6.098E 01	5.783E 01	5.484E 01	5.495E 01	5.409E 01	5.133E 01	5.011E 01	4.835E 01	4.501E 01
22500	6.409E 01	6.132E 01	5.972E 01	5.630E 01	5.358E 01	5.355E 01	5.275E 01	5.223E 01	5.017E 01	4.748E 01	4.453E 01
23000	6.340E 01	6.032E 01	5.852E 01	5.483E 01	5.188E 01	5.184E 01	5.115E 01	5.015E 01	4.809E 01	4.689E 01	4.499E 01
23500	6.271E 01	5.932E 01	5.732E 01	5.332E 01	5.012E 01	4.998E 01	4.933E 01	4.822E 01	4.616E 01	4.478E 01	4.308E 01
24000	6.202E 01	5.832E 01	5.612E 01	5.182E 01	4.832E 01	4.808E 01	4.743E 01	4.632E 01	4.426E 01	4.278E 01	4.128E 01
24500	6.133E 01	5.732E 01	5.492E 01	5.032E 01	4.652E 01	4.618E 01	4.553E 01	4.442E 01	4.236E 01	4.088E 01	3.938E 01
25000	6.064E 01	5.632E 01	5.372E 01	4.882E 01	4.482E 01	4.438E 01	4.373E 01	4.262E 01	4.056E 01	3.908E 01	3.758E 01
25500	5.995E 01	5.532E 01	5.252E 01	4.732E 01	4.312E 01	4.258E 01	4.193E 01	4.082E 01	3.876E 01	3.728E 01	3.578E 01
26000	5.926E 01	5.432E 01	5.132E 01	4.582E 01	4.152E 01	4.088E 01	4.023E 01	3.912E 01	3.706E 01	3.558E 01	3.408E 01
26500	5.857E 01	5.332E 01	5.012E 01	4.432E 01	4.002E 01	3.928E 01	3.853E 01	3.742E 01	3.536E 01	3.388E 01	3.238E 01
27000	5.788E 01	5.232E 01	4.892E 01	4.282E 01	3.852E 01	3.768E 01	3.693E 01	3.582E 01	3.376E 01	3.228E 01	3.078E 01
27500	5.719E 01	5.132E 01	4.772E 01	4.132E 01	3.702E 01	3.608E 01	3.533E 01	3.422E 01	3.216E 01	3.068E 01	2.918E 01
28000	5.650E 01	5.032E 01	4.652E 01	4.002E 01	3.572E 01	3.468E 01	3.393E 01	3.282E 01	3.076E 01	2.928E 01	2.778E 01
28500	5.581E 01	4.932E 01	4.532E 01	3.852E 01	3.422E 01	3.308E 01	3.233E 01	3.122E 01	2.916E 01	2.768E 01	2.618E 01
29000	5.512E 01	4.832E 01	4.412E 01	3.702E 01	3.272E 01	3.148E 01	3.073E 01	2.962E 01	2.756E 01	2.608E 01	2.458E 01
29500	5.443E 01	4.732E 01	4.292E 01	3.552E 01	3.122E 01	2.988E 01	2.913E 01	2.802E 01	2.596E 01	2.448E 01	2.298E 01
30000	5.374E 01	4.632E 01	4.172E 01	3.402E 01	2.972E 01	2.828E 01	2.753E 01	2.642E 01	2.436E 01	2.288E 01	2.138E 01
30500	5.305E 01	4.532E 01	4.052E 01	3.252E 01	2.822E 01	2.668E 01	2.593E 01	2.482E 01	2.276E 01	2.128E 01	1.978E 01
31000	5.236E 01	4.432E 01	3.942E 01	3.122E 01	2.692E 01	2.528E 01	2.453E 01	2.342E 01	2.136E 01	1.988E 01	1.838E 01
31500	5.167E 01	4.332E 01	3.822E 01	2.982E 01	2.552E 01	2.378E 01	2.303E 01	2.192E 01	1.986E 01	1.838E 01	1.688E 01
32000	5.098E 01	4.232E 01	3.702E 01	2.842E 01	2.412E 01	2.228E 01	2.153E 01	2.042E 01	1.836E 01	1.688E 01	1.538E 01
32500	5.029E 01	4.132E 01	3.582E 01	2.732E 01	2.302E 01	2.108E 01	2.033E 01	1.922E 01	1.716E 01	1.568E 01	1.418E 01
33000	4.960E 01	4.032E 01	3.462E 01	2.622E 01	2.192E 01	1.988E 01	1.913E 01	1.802E 01	1.596E 01	1.448E 01	1.298E 01
33500	4.891E 01	3.932E 01	3.352E 01	2.512E 01	2.082E 01	1.868E 01	1.793E 01	1.682E 01	1.476E 01	1.328E 01	1.178E 01
34000	4.822E 01	3.832E 01	3.242E 01	2.392E 01	1.962E 01	1.738E 01	1.663E 01	1.552E 01	1.346E 01	1.198E 01	1.048E 01
34500	4.753E 01	3.732E 01	3.132E 01	2.282E 01	1.852E 01	1.618E 01	1.543E 01	1.432E 01	1.226E 01	1.078E 01	0.928E 01
35000	4.684E 01	3.632E 01	3.022E 01	2.172E 01	1.742E 01	1.498E 01	1.423E 01	1.312E 01	1.106E 01	0.958E 01	0.808E 01
35500	4.615E 01	3.532E 01	2.912E 01	2.062E 01	1.632E 01	1.378E 01	1.303E 01	1.192E 01	0.986E 01	0.838E 01	0.688E 01
36000	4.546E 01	3.432E 01	2.802E 01	1.952E 01	1.522E 01	1.258E 01	1.183E 01	1.072E 01	0.866E 01	0.718E 01	0.568E 01
36500	4.477E 01	3.332E 01	2.692E 01	1.842E 01	1.412E 01	1.138E 01	1.063E 01	0.952E 01	0.746E 01	0.598E 01	0.448E 01
37000	4.408E 01	3.232E 01	2.582E 01	1.732E 01	1.302E 01	1.018E 01	0.943E 01	0.832E 01	0.626E 01	0.478E 01	0.328E 01
37500	4.339E 01	3.132E 01	2.472E 01	1.622E 01	1.192E 01	0.898E 01	0.823E 01	0.712E 01	0.506E 01	0.358E 01	0.208E 01
38000	4.270E 01	3.032E 01	2.362E 01	1.512E 01	1.082E 01	0.778E 01	0.703E 01	0.592E 01	0.386E 01	0.238E 01	0.088E 01
38500	4.201E 01	2.932E 01	2.252E 01	1.402E 01	0.972E 01	0.658E 01	0.583E 01	0.472E 01	0.266E 01	0.118E 01	0.068E 01
39000	4.132E 01	2.832E 01	2.142E 01	1.292E 01	0.862E 01	0.538E 01	0.463E 01	0.352E 01	0.146E 01	0.098E 01	0.048E 01
39500	4.063E 01	2.732E 01	2.032E 01	1.182E 01	0.752E 01	0.418E 01	0.343E 01	0.232E 01	0.026E 01	0.078E 01	0.028E 01
40000	4.000E 01	2.632E 01	1.932E 01	1.072E 01	0.642E 01	0.308E 01	0.233E 01	0.122E 01	0.016E 01	0.068E 01	0.018E 01
40500	3.931E 01	2.532E 01	1.832E 01	0.962E 01	0.526E 01	0.178E 01	0.103E 01	0.092E 01	0.006E 01	0.068E 01	0.018E 01
41000	3.862E 01	2.432E 01	1.732E 01	0.852E 01	0.410E 01	0.068E 01	0.033E 01	0.022E 01	0.006E 01	0.068E 01	0.018E 01
41500	3.793E 01	2.332E 01	1.632E 01	0.742E 01	0.294E 01	0.026E 01	0.003E 01	0.012E 01	0.006E 01	0.068E 01	0.018E 01
42000	3.724E 01	2.232E 01	1.532E 01	0.632E 01	0.178E 01	0.006E 01	0.003E 01	0.002E 01	0.006E 01	0.068E 01	0.018E 01
42500	3.655E 01	2.132E 01	1.432E 01	0.522E 01	0.062E 01	0.006E 01	0.003E 01	0.002E 01	0.006E 01	0.068E 01	0.018E 01
43000	3.586E 01	2.032E 01	1.332E 01	0.412E 01	0.006E 01	0.006E 01	0.003E 01	0.002E 01	0.006E 01	0.068E 01	0.018E 01
43500	3.517E 01	1.932E 01	1.232E 01	0.302E 01	0.006E 01	0.006E 01	0.003E 01	0.002E 01	0.006E 01	0.068E 01	0.018E 01
44000	3.448E 01	1.832E 01	1.132E 01	0.192E 01	0.006E 01	0.006E 01	0.003E 01	0.002E 01	0.006E 01	0.068E 01	0.018E 01
44500	3.379E 01	1.732E 01	1.032E 01	0.082E 01	0.006E 01	0.006E 01	0.003E 01	0.002E 01	0.006E 01	0.068E 01	0.018E 01
45000	3.310E 01	1.632E 01	0.932E 01	0.006E 01	0.006E 01	0.006E 01	0.003E 01	0.002E 01	0.006E 01	0.068E 01	0.018E 01

100000	8.9708 01	8.9702 01	8.9696 01	8.9690 01	8.9684 01	8.9678 01	8.9672 01	8.9666 01	8.9660 01	8.9654 01	8.9648 01	8.9642 01	8.9636 01	8.9630 01	8.9624 01	8.9618 01	8.9612 01	8.9606 01	8.9600 01	8.9594 01	8.9588 01	8.9582 01	8.9576 01	8.9570 01	8.9564 01	8.9558 01	8.9552 01	8.9546 01	8.9540 01	8.9534 01	8.9528 01	8.9522 01	8.9516 01	8.9510 01	8.9504 01	8.9498 01	8.9492 01	8.9486 01	8.9480 01	8.9474 01	8.9468 01	8.9462 01	8.9456 01	8.9450 01	8.9444 01	8.9438 01	8.9432 01	8.9426 01	8.9420 01	8.9414 01	8.9408 01	8.9402 01	8.9396 01	8.9390 01	8.9384 01	8.9378 01	8.9372 01	8.9366 01	8.9360 01	8.9354 01	8.9348 01	8.9342 01	8.9336 01	8.9330 01	8.9324 01	8.9318 01	8.9312 01	8.9306 01	8.9300 01	8.9294 01	8.9288 01	8.9282 01	8.9276 01	8.9270 01	8.9264 01	8.9258 01	8.9252 01	8.9246 01	8.9240 01	8.9234 01	8.9228 01	8.9222 01	8.9216 01	8.9210 01	8.9204 01	8.9198 01	8.9192 01	8.9186 01	8.9180 01	8.9174 01	8.9168 01	8.9162 01	8.9156 01	8.9150 01	8.9144 01	8.9138 01	8.9132 01	8.9126 01	8.9120 01	8.9114 01	8.9108 01	8.9102 01	8.9096 01	8.9090 01	8.9084 01	8.9078 01	8.9072 01	8.9066 01	8.9060 01	8.9054 01	8.9048 01	8.9042 01	8.9036 01	8.9030 01	8.9024 01	8.9018 01	8.9012 01	8.9006 01	8.9000 01	8.8994 01	8.8988 01	8.8982 01	8.8976 01	8.8970 01	8.8964 01	8.8958 01	8.8952 01	8.8946 01	8.8940 01	8.8934 01	8.8928 01	8.8922 01	8.8916 01	8.8910 01	8.8904 01	8.8898 01	8.8892 01	8.8886 01	8.8880 01	8.8874 01	8.8868 01	8.8862 01	8.8856 01	8.8850 01	8.8844 01	8.8838 01	8.8832 01	8.8826 01	8.8820 01	8.8814 01	8.8808 01	8.8802 01	8.8796 01	8.8790 01	8.8784 01	8.8778 01	8.8772 01	8.8766 01	8.8760 01	8.8754 01	8.8748 01	8.8742 01	8.8736 01	8.8730 01	8.8724 01	8.8718 01	8.8712 01	8.8706 01	8.8700 01	8.8694 01	8.8688 01	8.8682 01	8.8676 01	8.8670 01	8.8664 01	8.8658 01	8.8652 01	8.8646 01	8.8640 01	8.8634 01	8.8628 01	8.8622 01	8.8616 01	8.8610 01	8.8604 01	8.8598 01	8.8592 01	8.8586 01	8.8580 01	8.8574 01	8.8568 01	8.8562 01	8.8556 01	8.8550 01	8.8544 01	8.8538 01	8.8532 01	8.8526 01	8.8520 01	8.8514 01	8.8508 01	8.8502 01	8.8496 01	8.8490 01	8.8484 01	8.8478 01	8.8472 01	8.8466 01	8.8460 01	8.8454 01	8.8448 01	8.8442 01	8.8436 01	8.8430 01	8.8424 01	8.8418 01	8.8412 01	8.8406 01	8.8400 01	8.8394 01	8.8388 01	8.8382 01	8.8376 01	8.8370 01	8.8364 01	8.8358 01	8.8352 01	8.8346 01	8.8340 01	8.8334 01	8.8328 01	8.8322 01	8.8316 01	8.8310 01	8.8304 01	8.8298 01	8.8292 01	8.8286 01	8.8280 01	8.8274 01	8.8268 01	8.8262 01	8.8256 01	8.8250 01	8.8244 01	8.8238 01	8.8232 01	8.8226 01	8.8220 01	8.8214 01	8.8208 01	8.8202 01	8.8196 01	8.8190 01	8.8184 01	8.8178 01	8.8172 01	8.8166 01	8.8160 01	8.8154 01	8.8148 01	8.8142 01	8.8136 01	8.8130 01	8.8124 01	8.8118 01	8.8112 01	8.8106 01	8.8100 01	8.8094 01	8.8088 01	8.8082 01	8.8076 01	8.8070 01	8.8064 01	8.8058 01	8.8052 01	8.8046 01	8.8040 01	8.8034 01	8.8028 01	8.8022 01	8.8016 01	8.8010 01	8.8004 01	8.7998 01	8.7992 01	8.7986 01	8.7980 01	8.7974 01	8.7968 01	
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TABLE 105 (CONT.) DIMENSIONLESS INTERNAL ENERGY, E/RT, OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
1000	1.911E 01	1.692E 01	1.561E 01	1.481E 01	1.426E 01	1.368E 01	1.273E 01	1.119E 01	9.333E 00	7.653E 00
1050	2.082E 01	1.783E 01	1.599E 01	1.480E 01	1.418E 01	1.362E 01	1.290E 01	1.168E 01	9.978E 00	8.345E 00
1100	2.290E 01	1.908E 01	1.681E 01	1.510E 01	1.436E 01	1.356E 01	1.294E 01	1.198E 01	1.051E 01	8.787E 00
1150	2.521E 01	2.061E 01	1.747E 01	1.550E 01	1.430E 01	1.353E 01	1.292E 01	1.215E 01	1.091E 01	9.289E 00
1200	2.752E 01	2.235E 01	1.856E 01	1.607E 01	1.452E 01	1.357E 01	1.290E 01	1.222E 01	1.119E 01	9.721E 00
1250	2.960E 01	2.419E 01	1.982E 01	1.679E 01	1.487E 01	1.368E 01	1.290E 01	1.224E 01	1.137E 01	1.007E 01
1300	3.128E 01	2.598E 01	2.120E 01	1.763E 01	1.532E 01	1.386E 01	1.294E 01	1.235E 01	1.148E 01	1.035E 01
1350	3.266E 01	2.760E 01	2.262E 01	1.864E 01	1.589E 01	1.413E 01	1.303E 01	1.272E 01	1.155E 01	1.055E 01
1400	3.314E 01	2.893E 01	2.401E 01	1.969E 01	1.653E 01	1.447E 01	1.317E 01	1.231E 01	1.159E 01	1.070E 01
1450	3.339E 01	2.992E 01	2.529E 01	2.078E 01	1.720E 01	1.489E 01	1.336E 01	1.238E 01	1.163E 01	1.062E 01
1500	3.331E 01	3.057E 01	2.638E 01	2.185E 01	1.808E 01	1.536E 01	1.360E 01	1.248E 01	1.168E 01	1.090E 01
1550	3.301E 01	3.090E 01	2.726E 01	2.285E 01	1.887E 01	1.589E 01	1.389E 01	1.261E 01	1.174E 01	1.097E 01
1600	3.257E 01	3.097E 01	2.791E 01	2.376E 01	1.968E 01	1.645E 01	1.423E 01	1.278E 01	1.181E 01	1.104E 01
1650	3.206E 01	3.085E 01	2.833E 01	2.454E 01	2.046E 01	1.704E 01	1.459E 01	1.297E 01	1.191E 01	1.110E 01
1700	3.151E 01	3.058E 01	2.855E 01	2.517E 01	2.119E 01	1.764E 01	1.499E 01	1.320E 01	1.202E 01	1.110E 01
1750	3.095E 01	3.023E 01	2.860E 01	2.565E 01	2.185E 01	1.823E 01	1.540E 01	1.345E 01	1.216E 01	1.126E 01
1800	3.040E 01	2.982E 01	2.852E 01	2.599E 01	2.244E 01	1.879E 01	1.583E 01	1.372E 01	1.231E 01	1.135E 01
1850	2.988E 01	2.939E 01	2.833E 01	2.615E 01	2.293E 01	1.931E 01	1.626E 01	1.461E 01	1.248E 01	1.145E 01
1900	2.940E 01	2.895E 01	2.808E 01	2.628E 01	2.332E 01	1.983E 01	1.668E 01	1.430E 01	1.267E 01	1.157E 01
1950	2.899E 01	2.852E 01	2.779E 01	2.626E 01	2.362E 01	2.027E 01	1.709E 01	1.460E 01	1.286E 01	1.171E 01
2000	2.865E 01	2.811E 01	2.746E 01	2.610E 01	2.383E 01	2.066E 01	1.749E 01	1.491E 01	1.307E 01	1.185E 01
2050	2.831E 01	2.788E 01	2.720E 01	2.539E 01	2.398E 01	2.105E 01	1.808E 01	1.604E 01	1.392E 01	1.250E 01
2100	2.806E 01	2.733E 01	2.650E 01	2.451E 01	2.349E 01	2.187E 01	1.954E 01	1.697E 01	1.474E 01	1.315E 01
2150	2.789E 01	2.696E 01	2.597E 01	2.407E 01	2.291E 01	2.165E 01	1.982E 01	1.757E 01	1.539E 01	1.372E 01
2200	2.779E 01	2.682E 01	2.575E 01	2.385E 01	2.263E 01	2.132E 01	1.981E 01	1.788E 01	1.584E 01	1.415E 01
2250	2.773E 01	2.662E 01	2.564E 01	2.365E 01	2.240E 01	2.116E 01	1.970E 01	1.801E 01	1.612E 01	1.445E 01
2300	2.773E 01	2.646E 01	2.553E 01	2.342E 01	2.213E 01	2.132E 01	1.964E 01	1.805E 01	1.620E 01	1.465E 01
2350	2.783E 01	2.633E 01	2.543E 01	2.321E 01	2.181E 01	2.191E 01	1.977E 01	1.810E 01	1.630E 01	1.487E 01
2400	2.799E 01	2.622E 01	2.533E 01	2.300E 01	2.159E 01	2.207E 01	1.983E 01	1.823E 01	1.647E 01	1.487E 01
2450	2.824E 01	2.612E 01	2.523E 01	2.279E 01	2.138E 01	2.240E 01	2.005E 01	1.849E 01	1.660E 01	1.497E 01
2500	2.850E 01	2.602E 01	2.513E 01	2.258E 01	2.117E 01	2.269E 01	2.036E 01	1.885E 01	1.680E 01	1.508E 01
2550	2.876E 01	2.592E 01	2.503E 01	2.237E 01	2.096E 01	2.298E 01	2.067E 01	1.910E 01	1.700E 01	1.523E 01
2600	2.902E 01	2.582E 01	2.493E 01	2.216E 01	2.075E 01	2.327E 01	2.098E 01	1.939E 01	1.743E 01	1.543E 01
2650	2.928E 01	2.572E 01	2.483E 01	2.195E 01	2.054E 01	2.356E 01	2.129E 01	1.970E 01	1.785E 01	1.567E 01
2700	2.954E 01	2.562E 01	2.473E 01	2.174E 01	2.033E 01	2.385E 01	2.160E 01	1.991E 01	1.831E 01	1.595E 01
2750	2.980E 01	2.552E 01	2.463E 01	2.153E 01	2.012E 01	2.414E 01	2.191E 01	2.022E 01	1.880E 01	1.626E 01
2800	3.006E 01	2.542E 01	2.453E 01	2.132E 01	1.991E 01	2.443E 01	2.222E 01	2.053E 01	1.930E 01	1.660E 01
2850	3.032E 01	2.532E 01	2.443E 01	2.111E 01	1.970E 01	2.472E 01	2.253E 01	2.084E 01	1.980E 01	1.695E 01
2900	3.058E 01	2.522E 01	2.433E 01	2.090E 01	1.949E 01	2.501E 01	2.284E 01	2.115E 01	2.030E 01	1.730E 01
2950	3.084E 01	2.512E 01	2.423E 01	2.069E 01	1.928E 01	2.530E 01	2.315E 01	2.146E 01	2.080E 01	1.765E 01
3000	3.110E 01	2.502E 01	2.413E 01	2.048E 01	1.907E 01	2.559E 01	2.346E 01	2.177E 01	2.130E 01	1.800E 01
3050	3.136E 01	2.492E 01	2.403E 01	2.027E 01	1.886E 01	2.588E 01	2.377E 01	2.208E 01	2.180E 01	1.835E 01
3100	3.162E 01	2.482E 01	2.393E 01	2.006E 01	1.865E 01	2.617E 01	2.408E 01	2.239E 01	2.230E 01	1.870E 01
3150	3.188E 01	2.472E 01	2.383E 01	1.985E 01	1.844E 01	2.646E 01	2.439E 01	2.270E 01	2.280E 01	1.905E 01
3200	3.214E 01	2.462E 01	2.373E 01	1.964E 01	1.823E 01	2.675E 01	2.470E 01	2.301E 01	2.330E 01	1.940E 01
3250	3.240E 01	2.452E 01	2.363E 01	1.943E 01	1.802E 01	2.704E 01	2.501E 01	2.332E 01	2.380E 01	1.975E 01
3300	3.266E 01	2.442E 01	2.353E 01	1.922E 01	1.781E 01	2.733E 01	2.532E 01	2.363E 01	2.430E 01	2.010E 01
3350	3.292E 01	2.432E 01	2.343E 01	1.901E 01	1.760E 01	2.762E 01	2.563E 01	2.394E 01	2.480E 01	2.045E 01
3400	3.318E 01	2.422E 01	2.333E 01	1.880E 01	1.739E 01	2.791E 01	2.594E 01	2.425E 01	2.530E 01	2.080E 01
3450	3.344E 01	2.412E 01	2.323E 01	1.859E 01	1.718E 01	2.820E 01	2.625E 01	2.456E 01	2.580E 01	2.115E 01
3500	3.370E 01	2.402E 01	2.313E 01	1.838E 01	1.697E 01	2.849E 01	2.656E 01	2.487E 01	2.630E 01	2.150E 01
3550	3.396E 01	2.392E 01	2.303E 01	1.817E 01	1.676E 01	2.878E 01	2.687E 01	2.518E 01	2.680E 01	2.185E 01
3600	3.422E 01	2.382E 01	2.293E 01	1.796E 01	1.655E 01	2.907E 01	2.718E 01	2.549E 01	2.730E 01	2.220E 01
3650	3.448E 01	2.372E 01	2.283E 01	1.775E 01	1.634E 01	2.936E 01	2.749E 01	2.580E 01	2.780E 01	2.255E 01
3700	3.474E 01	2.362E 01	2.273E 01	1.754E 01	1.613E 01	2.965E 01	2.780E 01	2.611E 01	2.830E 01	2.290E 01
3750	3.500E 01	2.352E 01	2.263E 01	1.733E 01	1.592E 01	2.994E 01	2.811E 01	2.642E 01	2.880E 01	2.325E 01
3800	3.526E 01	2.342E 01	2.253E 01	1.712E 01	1.571E 01	3.023E 01	2.842E 01	2.673E 01	2.930E 01	2.360E 01
3850	3.552E 01	2.332E 01	2.243E 01	1.691E 01	1.550E 01	3.052E 01	2.873E 01	2.704E 01	2.980E 01	2.395E 01
3900	3.578E 01	2.322E 01	2.233E 01	1.670E 01	1.529E 01	3.081E 01	2.904E 01	2.735E 01	3.030E 01	2.430E 01
3950	3.604E 01	2.312E 01	2.223E 01	1.649E 01	1.508E 01	3.110E 01	2.935E 01	2.766E 01	3.080E 01	2.465E 01
4000	3.630E 01	2.302E 01	2.213E 01	1.628E 01	1.487E 01	3.139E 01	2.966E 01	2.797E 01	3.130E 01	2.500E 01
4050	3.656E 01	2.292E 01	2.203E 01	1.607E 01	1.466E 01	3.168E 01	2.997E 01	2.828E 01	3.180E 01	2.535E 01
4100	3.682E 01	2.282E 01	2.193E 01	1.586E 01	1.445E 01	3.197E 01	3.028E 01	2.859E 01	3.230E 01	2.570E 01
4150	3.708E 01	2.272E 01	2.183E 01	1.565E 01	1.424E 01	3.226E 01	3.059E 01	2.890E 01	3.280E 01	2.605E 01
4200	3.734E 01	2.262E 01	2.173E 01	1.544E 01	1.403E 01	3.255E 01	3.090E 01	2.921E 01	3.330E 01	2.640E 01
4250	3.760E 01	2.252E 01	2.163E 01	1.523E 01	1.382E 01	3.284E 01	3.121E 01	2.952E 01	3.380E 01	2.675E 01
4300	3.786E 01	2.242E 01	2.153E 01	1.502E 01	1.361E 01	3.313E 01	3.152E 01	2.983E 01	3.430E 01	2.710E 01
4350	3.812E 01	2.232E 01	2.143E 01	1.481E 01	1.340E 01	3.342E 01	3.183E 01	3.014E 01	3.480E 01	2.745E 01
4400	3.838E 01	2.222E 01	2.133E 01	1.460E 01	1.319E 01	3.371E 01	3.214E 01	3.045E 01	3.530E 01	2.780E 01
4450	3.864E 01	2.212E 01	2.123E 01	1.439E 01	1.298E 01	3.400E 01	3.245E 01	3.076E 01	3.580E 01	2.815E 01
4500	3.890E 01	2.202E 01	2.113E 01	1.418E 01	1.277E 01	3.429E 01	3.276E 01	3.107E 01	3.630E 01	2.850E 01
4550	3.916E 01	2.192E 01	2.103E 01	1.397E 01	1.256E 01	3.458E 01	3.307E 01	3.138E 01	3.680E 01	2.885E 01
4600	3.942E 01	2.182E 01	2.093E 01	1.376E 01	1.235E 01	3.487E 01	3.338E 01	3.169E 01	3.730E 01	2.920E 01
4650	3.968E 01	2.172E 01	2.083E 01	1.355E 01	1.214E 01	3.516E 01	3.369E 01	3.200E 01	3.780E 01	2.955E 01
4700	3.994E 01	2.162E 01	2.073E 01	1.334E 01	1.193E 01	3.545E 01	3.400E 01	3.231E 01	3.830E 01	2.990E 01
4750	4.020E 01	2.152E 01	2.063E 01	1.313E 01	1.172E 01	3.574E 01	3.431E 01	3.262E 01	3.880E 01	3.025E 01
4800	4.046E 01	2.142E 01	2.053E 01	1.292E 01	1.151E 01	3.603E 01	3.462E 01	3.293E 01	3.930E 01	3.060E 01
4850	4.072E 01	2.132E 01	2.043E 01	1.271E 01	1.130E 01	3.632E 01	3.493E 01	3.324E 01	3.980E 01	3.095E 01
4900	4.098E 01	2.122E 01	2.033E 01	1.250E 01	1.109E 01	3.661E 01	3.524E 01			

15CCCO	7.779E 01	7.779E 01	9.971E 01	9.754E 01	9.083E 01	4.416E 01	3.801E 01	3.204E 01	2.062E 01	2.394E 01
20CCCO	6.552E 01	6.481E 01	6.328E 01	6.071E 01	5.701E 01	5.192E 01	4.584E 01	3.972E 01	3.407E 01	2.912E 01
30CCCO	5.403E 01	5.391E 01	5.367E 01	5.314E 01	5.20CE 01	4.986E 01	4.649E 01	4.26CE 01	3.844E 01	3.172E 01
40CCCO	4.275E 01	4.241E 01	4.220E 01	4.199E 01	4.169E 01	4.115E 01	4.015E 01	3.839E 01	3.562E 01	3.115E 01
50CCCO	5.763E 01	4.988E 01	4.288E 01	3.882E 01	3.699E 01	3.607E 01	3.529E 01	3.429E 01	3.261E 01	3.016E 01
60CCCO	7.545E 01	6.541E 01	5.774E 01	5.130E 01	4.447E 01	3.833E 01	3.447E 01	3.279E 01	3.060E 01	2.862E 01
70CCCO	8.853E 01	7.675E 01	7.091E 01	6.254E 01	5.424E 01	4.742E 01	4.099E 01	3.521E 01	3.112E 01	2.827E 01
80CCCO	7.149E 01	7.114E 01	7.023E 01	6.83CE 01	6.513E 01	6.048E 01	5.388E 01	4.69CE 01	3.978E 01	3.374E 01
90CCCO	6.224E 01	6.221E 01	6.212E 01	6.189E 01	6.131E 01	5.992E 01	5.726E 01	5.304E 01	4.719E 01	4.052E 01
10CCCO	4.972E 01	4.971E 01	4.969E 01	4.966E 01	4.960E 01	4.947E 01	4.922E 01	4.866E 01	4.748E 01	4.517E 01
20CCCO	4.346E 01	4.345E 01	4.344E 01	4.342E 01	4.318E 01	4.332E 01	4.320E 01	4.297E 01	4.294E 01	4.17CE 01
30CCCO	3.749E 01	3.743E 01	3.736E 01	3.728E 01	3.721E 01	3.714E 01	3.706E 01	3.695E 01	3.675E 01	3.639E 01
40CCCO	3.431E 01	3.431E 01	3.430E 01	3.429E 01	3.428E 01	3.420E 01	3.411E 01	3.398E 01	3.381E 01	3.357E 01
50CCCO	3.239E 01	3.238E 01	3.238E 01	3.238E 01	3.237E 01	3.235E 01	3.231E 01	3.224E 01	3.211E 01	3.191E 01
60CCCO	3.110E 01	3.110E 01	3.110E 01	3.109E 01	3.109E 01	3.107E 01	3.105E 01	3.101E 01	3.093E 01	3.079E 01
70CCCO	2.949E 01	2.949E 01	2.949E 01	2.949E 01	2.949E 01	2.948E 01	2.946E 01	2.944E 01	2.940E 01	2.932E 01
80CCCO	2.853E 01	2.853E 01	2.853E 01	2.853E 01	2.852E 01	2.852E 01	2.851E 01	2.849E 01	2.846E 01	2.841E 01

TABLE 106. INTERNAL ENERGY (ERG/GM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
10000	1.422E 12	1.421E 12	1.421E 12	1.418E 12	1.439E 12	1.383E 12	1.315E 12	1.18CE 12	9.885F 11	7.981E 11	6.493E 11
10500	1.432E 12	1.432E 12	1.431E 12	1.430E 12	1.426E 12	1.414E 12	1.380E 12	1.297E 12	1.143E 12	9.441E 11	7.638E 11
11000	1.445E 12	1.442E 12	1.442E 12	1.441E 12	1.439E 12	1.433E 12	1.416E 12	1.370E 12	1.264E 12	1.090E 12	8.924E 11
11500	1.464E 12	1.455E 12	1.453E 12	1.451E 12	1.450E 12	1.447E 12	1.439E 12	1.413E 12	1.340E 12	1.214E 12	1.024E 12
12000	1.504E 12	1.476E 12	1.466E 12	1.463E 12	1.461E 12	1.459E 12	1.455E 12	1.441E 12	1.402E 12	1.309E 12	1.146E 12
12500	1.502E 12	1.518E 12	1.487E 12	1.476E 12	1.473E 12	1.471E 12	1.466E 12	1.460E 12	1.437E 12	1.376E 12	1.249E 12
13000	1.798E 12	1.608E 12	1.526E 12	1.496E 12	1.486E 12	1.482E 12	1.480E 12	1.475E 12	1.461E 12	1.422E 12	1.329E 12
13500	2.104E 12	1.782E 12	1.606E 12	1.531E 12	1.504E 12	1.495E 12	1.491E 12	1.488E 12	1.479E 12	1.454E 12	1.389E 12
14000	2.464E 12	2.053E 12	1.753E 12	1.598E 12	1.535E 12	1.512E 12	1.504E 12	1.500E 12	1.494E 12	1.477E 12	1.433E 12
14500	2.793E 12	2.382E 12	1.985E 12	1.718E 12	1.588E 12	1.537E 12	1.519E 12	1.512E 12	1.507E 12	1.496E 12	1.465E 12
15000	3.058E 12	2.705E 12	2.279E 12	1.908E 12	1.681E 12	1.579E 12	1.540E 12	1.527E 12	1.520E 12	1.511E 12	1.490E 12
15500	3.272E 12	2.979E 12	2.508E 12	2.161E 12	1.850E 12	1.649E 12	1.572E 12	1.544E 12	1.533E 12	1.525E 12	1.510E 12
16000	3.445E 12	3.203E 12	2.869E 12	2.446E 12	2.037E 12	1.759E 12	1.623E 12	1.569E 12	1.549E 12	1.539E 12	1.526E 12
16500	3.570E 12	3.387E 12	3.105E 12	2.725E 12	2.287E 12	1.919E 12	1.702E 12	1.605E 12	1.568E 12	1.553E 12	1.542E 12
17000	3.652E 12	3.528E 12	3.303E 12	2.974E 12	2.552E 12	2.124E 12	1.817E 12	1.659E 12	1.594E 12	1.570E 12	1.556E 12
17500	3.704E 12	3.627E 12	3.422E 12	3.187E 12	2.806E 12	2.359E 12	1.974E 12	1.739E 12	1.631E 12	1.590E 12	1.572E 12
18000	3.740E 12	3.693E 12	3.502E 12	3.365E 12	3.033E 12	2.604E 12	2.167E 12	1.950E 12	1.804E 12	1.746E 12	1.588E 12
18500	3.770E 12	3.738E 12	3.607E 12	3.508E 12	3.230E 12	2.838E 12	2.383E 12	2.195E 12	1.759E 12	1.651E 12	1.608E 12
19000	3.799E 12	3.772E 12	3.725E 12	3.616E 12	3.396E 12	3.051E 12	2.608E 12	2.169E 12	1.658E 12	1.499E 12	1.632E 12
19500	3.835E 12	3.802E 12	3.748E 12	3.694E 12	3.530E 12	3.237E 12	2.828E 12	2.364E 12	1.905E 12	1.763E 12	1.644E 12
20000	3.866E 12	3.835E 12	3.802E 12	3.750E 12	3.633E 12	3.397E 12	3.028E 12	2.588E 12	2.137E 12	1.848E 12	1.705E 12
20500	3.896E 12	3.866E 12	3.835E 12	3.788E 12	3.851E 12	3.776E 12	3.611E 12	3.303E 12	2.862E 12	2.384E 12	2.013E 12
21000	3.927E 12	3.897E 12	3.871E 12	3.838E 12	4.021E 12	3.943E 12	3.873E 12	3.740E 12	3.472E 12	3.050E 12	2.557E 12
21500	3.957E 12	3.927E 12	3.900E 12	3.871E 12	4.058E 12	4.178E 12	4.040E 12	3.944E 12	3.826E 12	3.570E 12	3.151E 12
22000	3.986E 12	3.956E 12	3.928E 12	3.900E 12	4.095E 12	4.286E 12	4.347E 12	4.141E 12	4.027E 12	3.886E 12	3.617E 12
22500	4.015E 12	3.985E 12	3.957E 12	3.929E 12	4.132E 12	4.378E 12	4.525E 12	4.497E 12	4.234E 12	4.089E 12	3.920E 12
23000	4.044E 12	4.014E 12	3.986E 12	3.958E 12	4.169E 12	4.409E 12	4.593E 12	4.579E 12	4.604E 12	4.307E 12	4.133E 12
23500	4.073E 12	4.043E 12	4.015E 12	3.987E 12	4.206E 12	4.446E 12	4.683E 12	4.677E 12	5.249E 12	4.666E 12	4.354E 12
24000	4.102E 12	4.072E 12	4.044E 12	4.016E 12	4.243E 12	4.493E 12	4.768E 12	4.762E 12	5.249E 12	5.242E 12	4.680E 12
24500	4.131E 12	4.101E 12	4.073E 12	4.045E 12	4.280E 12	4.540E 12	4.915E 12	4.915E 12	6.854E 12	5.919E 12	5.176E 12
25000	4.160E 12	4.130E 12	4.102E 12	4.074E 12	4.317E 12	4.587E 12	5.274E 12	5.274E 12	7.474E 12	6.721E 12	5.820E 12
25500	4.189E 12	4.159E 12	4.131E 12	4.103E 12	4.354E 12	4.634E 12	5.607E 12	5.607E 12	7.929E 12	7.352E 12	6.509E 12
26000	4.218E 12	4.188E 12	4.160E 12	4.132E 12	4.391E 12	4.681E 12	5.932E 12	5.932E 12	8.308E 12	7.845E 12	7.143E 12
26500	4.247E 12	4.217E 12	4.189E 12	4.161E 12	4.428E 12	4.728E 12	6.257E 12	6.257E 12	8.736E 12	8.246E 12	7.673E 12
27000	4.276E 12	4.246E 12	4.218E 12	4.190E 12	4.465E 12	4.775E 12	6.582E 12	6.582E 12	9.322E 12	8.646E 12	8.110E 12
27500	4.305E 12	4.275E 12	4.247E 12	4.219E 12	4.502E 12	4.822E 12	6.907E 12	6.907E 12	1.010E 13	9.134E 12	8.506E 12
28000	4.334E 12	4.304E 12	4.276E 12	4.248E 12	4.539E 12	4.869E 12	7.232E 12	7.232E 12	1.035E 13	9.628E 12	8.991E 12
28500	4.363E 12	4.333E 12	4.305E 12	4.277E 12	4.576E 12	4.916E 12	7.557E 12	7.557E 12	1.060E 13	1.010E 13	9.486E 12
29000	4.392E 12	4.362E 12	4.334E 12	4.306E 12	4.613E 12	4.963E 12	7.882E 12	7.882E 12	1.085E 13	1.035E 13	9.981E 12
29500	4.421E 12	4.391E 12	4.363E 12	4.335E 12	4.650E 12	5.010E 12	8.207E 12	8.207E 12	1.110E 13	1.060E 13	1.048E 13
30000	4.450E 12	4.420E 12	4.392E 12	4.364E 12	4.687E 12	5.057E 12	8.532E 12	8.532E 12	1.135E 13	1.085E 13	1.100E 13
30500	4.479E 12	4.449E 12	4.421E 12	4.393E 12	4.724E 12	5.104E 12	8.857E 12	8.857E 12	1.160E 13	1.110E 13	1.152E 13
31000	4.508E 12	4.478E 12	4.450E 12	4.422E 12	4.761E 12	5.151E 12	9.182E 12	9.182E 12	1.185E 13	1.135E 13	1.204E 13
31500	4.537E 12	4.507E 12	4.479E 12	4.451E 12	4.798E 12	5.198E 12	9.507E 12	9.507E 12	1.210E 13	1.160E 13	1.256E 13
32000	4.566E 12	4.536E 12	4.508E 12	4.480E 12	4.835E 12	5.245E 12	9.832E 12	9.832E 12	1.235E 13	1.185E 13	1.308E 13
32500	4.595E 12	4.565E 12	4.537E 12	4.509E 12	4.872E 12	5.292E 12	1.0157E 12	1.0157E 12	1.260E 13	1.210E 13	1.360E 13
33000	4.624E 12	4.594E 12	4.566E 12	4.538E 12	4.909E 12	5.339E 12	1.0482E 12	1.0482E 12	1.285E 13	1.235E 13	1.412E 13
33500	4.653E 12	4.623E 12	4.595E 12	4.567E 12	4.946E 12	5.386E 12	1.0807E 12	1.0807E 12	1.310E 13	1.260E 13	1.464E 13
34000	4.682E 12	4.652E 12	4.624E 12	4.596E 12	4.983E 12	5.433E 12	1.1132E 12	1.1132E 12	1.335E 13	1.285E 13	1.516E 13
34500	4.711E 12	4.681E 12	4.653E 12	4.625E 12	5.020E 12	5.480E 12	1.1457E 12	1.1457E 12	1.360E 13	1.310E 13	1.568E 13
35000	4.740E 12	4.710E 12	4.682E 12	4.654E 12	5.057E 12	5.527E 12	1.1782E 12	1.1782E 12	1.385E 13	1.335E 13	1.620E 13
35500	4.769E 12	4.739E 12	4.711E 12	4.683E 12	5.094E 12	5.574E 12	1.2107E 12	1.2107E 12	1.410E 13	1.360E 13	1.672E 13
36000	4.798E 12	4.768E 12	4.740E 12	4.712E 12	5.131E 12	5.621E 12	1.2432E 12	1.2432E 12	1.435E 13	1.385E 13	1.724E 13
36500	4.827E 12	4.797E 12	4.769E 12	4.741E 12	5.168E 12	5.668E 12	1.2757E 12	1.2757E 12	1.460E 13	1.410E 13	1.776E 13
37000	4.856E 12	4.826E 12	4.798E 12	4.770E 12	5.205E 12	5.715E 12	1.3082E 12	1.3082E 12	1.485E 13	1.435E 13	1.828E 13
37500	4.885E 12	4.855E 12	4.827E 12	4.799E 12	5.242E 12	5.762E 12	1.3407E 12	1.3407E 12	1.510E 13	1.460E 13	1.880E 13
38000	4.914E 12	4.884E 12	4.856E 12	4.828E 12	5.279E 12	5.809E 12	1.3732E 12	1.3732E 12	1.535E 13	1.485E 13	1.932E 13
38500	4.943E 12	4.913E 12	4.885E 12	4.857E 12	5.316E 12	5.856E 12	1.4057E 12	1.4057E 12	1.560E 13	1.510E 13	1.984E 13
39000	4.972E 12	4.942E 12	4.914E 12	4.886E 12	5.353E 12	5.903E 12	1.4382E 12	1.4382E 12	1.585E 13	1.535E 13	2.036E 13
39500	5.001E 12	4.971E 12	4.943E 12	4.915E 12	5.390E 12	5.950E 12	1.4707E 12	1.4707E 12	1.610E 13	1.560E 13	2.088E 13
40000	5.030E 12	5.000E 12	4.972E 12	4.944E 12	5.427E 12	6.000E 12	1.5032E 12	1.5032E 12	1.635E 13	1.585E 13	2.140E 13
40500	5.059E 12	5.029E 12	5.001E 12	4.973E 12	5.464E 12	6.047E 12	1.5357E 12	1.5357E 12	1.660E 13	1.610E 13	2.192E 13
41000	5.088E 12	5.058E 12	5.030E 12	4.999E 12	5.501E 12	6.094E 12	1.5682E 12	1.5682E 12	1.685E 13	1.635E 13	2.244E 13
41500	5.117E 12	5.087E 12	5.059E 12	5.031E 12	5.538E 12	6.141E 12	1.6007E 12	1.6007E 12	1.710E 13	1.660E 13	2.296E 13
42000	5.146E 12	5.116E 12	5.088E 12	5.060E 12	5.575E 12	6.188E 12	1.6332E 12	1.6332E 12	1.735E 13	1.685E 13	2.348E 13
42500	5.175E 12	5.145E 12	5.117E 12	5.089E 12	5.612E 12	6.235E 12	1.6657E 12	1.6657E 12	1.760E 13	1.710E 13	2.400E 13
43000	5.204E 12	5.174E 12	5.146E 12	5.118E 12	5.649E 12	6.282E 12	1.6982E 12	1.6982E 12	1.785E 13	1.735E 13	2.452E 13
43500	5.233E 12	5.203E 12	5.175E 12	5.147E 12	5.686E 12	6.329E 12	1.7307E 12	1.7307E 12	1.810E 13	1.760E 13	2.504E 13
44000	5.262E 12	5.232E 12	5.204E 12	5.176E 12	5.723E 12	6.376E 12	1.7632E 12	1.7632E 12	1.835E 13	1.785E 13	2.556E 13
44500	5.291E 12	5.261E 12	5.233E 12	5.205E 12	5.760E 12	6.423E 12	1.7957E 12	1.7957E 12	1.860E 13	1.810E 13	2.608E 13
45000	5.320E 12	5.290E 12	5.262E 12	5.234E 12	5.797E 12	6.470E 12	1.8282E 12	1.8282E 12	1.885E 13	1.835E 13	2.660E 13
45500	5.349E 12	5.319E 12	5.291E 12	5.263E 12	5.834						

TABLE 1C6(Cont): INTERNAL ENERGY (ERG/CM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
10000	3.404E 11	4.857E 11	4.479E 11	4.250E 11	4.092E 11	3.925E 11	3.653E 11	3.212E 11	2.679E 11	2.140E 11
10500	6.273E 11	5.374E 11	4.810E 11	4.483E 11	4.273E 11	4.105E 11	3.807E 11	3.525E 11	3.007E 11	2.481E 11
11000	7.231E 11	6.023E 11	5.245E 11	4.769E 11	4.479E 11	4.281E 11	4.009E 11	3.784E 11	3.318E 11	2.773E 11
11500	8.320E 11	6.803E 11	5.748E 11	5.116E 11	4.719E 11	4.467E 11	4.266E 11	4.009E 11	3.461E 11	3.044E 11
12000	9.477E 11	7.700E 11	6.392E 11	5.534E 11	5.002E 11	4.673E 11	4.444E 11	4.208E 11	3.654E 11	3.240E 11
12500	1.042E 12	8.679E 11	7.111E 11	6.025E 11	5.334E 11	4.907E 11	4.623E 11	4.393E 11	4.000E 11	3.614E 11
13000	1.147E 12	9.695E 11	7.916E 11	6.590E 11	5.710E 11	5.173E 11	4.829E 11	4.572E 11	4.204E 11	3.841E 11
13500	1.250E 12	1.069E 12	8.766E 11	7.223E 11	6.157E 11	5.476E 11	5.049E 11	4.759E 11	4.475E 11	4.089E 11
14000	1.332E 12	1.163E 12	9.649E 11	7.914E 11	6.649E 11	5.817E 11	5.292E 11	4.947E 11	4.659E 11	4.302E 11
14500	1.389E 12	1.245E 12	1.052E 12	8.648E 11	7.190E 11	6.197E 11	5.561E 11	5.152E 11	4.842E 11	4.501E 11
15000	1.434E 12	1.316E 12	1.136E 12	9.406E 11	7.775E 11	6.615E 11	5.857E 11	5.372E 11	5.029E 11	4.693E 11
15500	1.469E 12	1.375E 12	1.213E 12	1.017E 12	8.394E 11	7.049E 11	6.182E 11	5.611E 11	5.222E 11	4.881E 11
16000	1.496E 12	1.422E 12	1.282E 12	1.091E 12	9.036E 11	7.556E 11	6.533E 11	5.868E 11	5.425E 11	5.040E 11
16500	1.518E 12	1.461E 12	1.342E 12	1.162E 12	9.680E 11	8.070E 11	6.911E 11	6.195E 11	5.640E 11	5.259E 11
17000	1.537E 12	1.492E 12	1.393E 12	1.228E 12	1.034E 12	8.605E 11	7.313E 11	6.451E 11	5.847E 11	5.453E 11
17500	1.554E 12	1.518E 12	1.437E 12	1.289E 12	1.090E 12	9.154E 11	7.735E 11	6.756E 11	6.100E 11	5.654E 11
18000	1.570E 12	1.541E 12	1.473E 12	1.343E 12	1.159E 12	9.710E 11	8.177E 11	7.086E 11	6.361E 11	5.843E 11
18500	1.587E 12	1.561E 12	1.505E 12	1.391E 12	1.217E 12	1.027E 12	8.632E 11	7.437E 11	6.628E 11	6.080E 11
19000	1.603E 12	1.579E 12	1.532E 12	1.433E 12	1.272E 12	1.081E 12	9.097E 11	7.800E 11	6.908E 11	6.311E 11
19500	1.622E 12	1.596E 12	1.555E 12	1.470E 12	1.322E 12	1.134E 12	9.567E 11	8.174E 11	7.199E 11	6.553E 11
20000	1.645E 12	1.614E 12	1.577E 12	1.503E 12	1.368E 12	1.186E 12	1.004E 12	8.588E 11	7.501E 11	6.804E 11
20500	1.661E 12	1.704E 12	1.654E 12	1.604E 12	1.514E 12	1.267E 12	1.186E 12	1.014E 12	8.788E 11	7.891E 11
21000	2.139E 12	1.882E 12	1.757E 12	1.688E 12	1.610E 12	1.506E 12	1.344E 12	1.169E 12	1.015E 12	9.059E 11
26000	2.649E 12	2.213E 12	1.938E 12	1.796E 12	1.710E 12	1.615E 12	1.479E 12	1.311E 12	1.148E 12	1.024E 12
28000	3.183E 12	2.671E 12	2.239E 12	1.967E 12	1.819E 12	1.714E 12	1.592E 12	1.437E 12	1.273E 12	1.137E 12
30000	3.618E 12	3.153E 12	2.638E 12	2.228E 12	1.972E 12	1.822E 12	1.696E 12	1.551E 12	1.388E 12	1.245E 12
32000	3.924E 12	3.569E 12	3.070E 12	2.565E 12	2.189E 12	1.958E 12	1.804E 12	1.658E 12	1.495E 12	1.340E 12
34000	4.150E 12	3.687E 12	3.468E 12	2.843E 12	2.469E 12	2.138E 12	1.929E 12	1.764E 12	1.558E 12	1.462E 12
36000	4.370E 12	4.132E 12	3.750E 12	3.314E 12	2.789E 12	2.364E 12	2.080E 12	1.894E 12	1.702E 12	1.537E 12
38000	4.659E 12	4.354E 12	4.044E 12	3.648E 12	3.122E 12	2.627E 12	2.263E 12	2.017E 12	1.811E 12	1.632E 12
40000	5.071E 12	4.610E 12	4.296E 12	3.933E 12	3.442E 12	2.912E 12	2.475E 12	2.169E 12	1.929E 12	1.732E 12
42000	5.612E 12	4.946E 12	4.532E 12	4.181E 12	3.734E 12	3.201E 12	2.710E 12	2.341E 12	2.059E 12	1.837E 12
44000	6.228E 12	5.303E 12	4.810E 12	4.414E 12	3.998E 12	3.481E 12	2.958E 12	2.532E 12	2.201E 12	1.944E 12
46000	6.841E 12	5.704E 12	5.155E 12	4.658E 12	4.236E 12	3.744E 12	3.208E 12	2.735E 12	2.357E 12	2.069E 12
48000	7.394E 12	6.463E 12	5.574E 12	4.937E 12	4.470E 12	3.990E 12	3.454E 12	2.947E 12	2.523E 12	2.198E 12
50000	7.874E 12	7.012E 12	6.049E 12	5.265E 12	4.713E 12	4.223E 12	3.692E 12	3.162E 12	2.698E 12	2.334E 12
60000	1.019E 13	9.193E 12	8.354E 12	7.392E 12	6.365E 12	5.497E 12	4.816E 12	4.210E 12	3.623E 12	3.095E 12
70000	1.353E 13	1.199E 13	1.052E 13	9.355E 12	8.295E 12	7.188E 12	6.158E 12	5.307E 12	4.583E 12	3.931E 12
80000	1.647E 13	1.490E 13	1.330E 13	1.163E 13	1.016E 13	8.904E 12	7.700E 12	6.550E 12	5.649E 12	4.842E 12

190000	2.821E 13	2.790E 13	2.725E 13	2.614E 13	2.432E 13	2.222E 13	2.000E 13	1.777E 13	1.555E 13	1.333E 13	1.111E 13	9.090E 12	7.070E 12	5.050E 12	3.030E 12	1.010E 12
200000	3.101E 13	3.095E 13	3.081E 13	3.051E 13	2.985E 13	2.842E 13	2.642E 13	2.400E 13	2.133E 13	1.844E 13	1.533E 13	1.200E 13	8.666E 12	5.333E 12	2.000E 12	0.000E 12
300000	3.601E 13	3.652E 13	3.634E 13	3.610E 13	3.590E 13	3.543E 13	3.432E 13	3.277E 13	3.077E 13	2.833E 13	2.555E 13	2.244E 13	1.900E 13	1.533E 13	1.133E 13	0.733E 13
400000	6.616E 13	5.727E 13	4.923E 13	4.457E 13	4.247E 13	4.141E 13	4.032E 13	3.932E 13	3.832E 13	3.744E 13	3.656E 13	3.568E 13	3.480E 13	3.392E 13	3.304E 13	3.216E 13

500000	1.083E 14	9.419E 13	8.287E 13	7.343E 13	6.383E 13	5.501E 13	4.947E 13	4.635E 13	4.362E 13	4.044E 13	3.744E 13	3.466E 13	3.200E 13	2.944E 13	2.688E 13	2.432E 13
600000	1.387E 14	1.322E 14	1.221E 14	1.077E 14	9.340E 13	8.107E 13	7.060E 13	6.244E 13	5.600E 13	5.044E 13	4.577E 13	4.188E 13	3.866E 13	3.566E 13	3.288E 13	3.032E 13
800000	1.642E 14	1.634E 14	1.613E 14	1.568E 14	1.496E 14	1.389E 14	1.237E 14	1.088E 14	9.134E 13	7.644E 13	6.400E 13	5.388E 13	4.577E 13	3.932E 13	3.444E 13	3.000E 13
1000000	1.787E 14	1.786E 14	1.783E 14	1.777E 14	1.760E 14	1.720E 14	1.643E 14	1.522E 14	1.354E 14	1.144E 14	9.322E 13	7.644E 13	6.277E 13	5.200E 13	4.333E 13	3.566E 13
1500000	2.141E 14	2.140E 14	2.139E 14	2.138E 14	2.135E 14	2.130E 14	2.119E 14	2.095E 14	2.044E 14	1.944E 14	1.800E 14	1.622E 14	1.411E 14	1.166E 14	9.444E 13	7.777E 13
2000000	2.495E 14	2.494E 14	2.494E 14	2.492E 14	2.490E 14	2.487E 14	2.480E 14	2.467E 14	2.442E 14	2.394E 14	2.300E 14	2.166E 14	1.988E 14	1.766E 14	1.500E 14	1.244E 14
3000000	3.228E 14	3.223E 14	3.217E 14	3.210E 14	3.204E 14	3.198E 14	3.191E 14	3.181E 14	3.164E 14	3.134E 14	3.088E 14	3.022E 14	2.944E 14	2.854E 14	2.754E 14	2.654E 14
4000000	3.939E 14	3.934E 14	3.930E 14	3.927E 14	3.923E 14	3.927E 14	3.910E 14	3.902E 14	3.882E 14	3.854E 14	3.808E 14	3.742E 14	3.666E 14	3.580E 14	3.484E 14	3.388E 14
5000000	4.648E 14	4.648E 14	4.647E 14	4.646E 14	4.645E 14	4.642E 14	4.637E 14	4.627E 14	4.609E 14	4.579E 14	4.533E 14	4.477E 14	4.411E 14	4.333E 14	4.244E 14	4.156E 14
6000000	5.356E 14	5.356E 14	5.355E 14	5.355E 14	5.354E 14	5.352E 14	5.348E 14	5.341E 14	5.327E 14	5.303E 14	5.266E 14	5.218E 14	5.160E 14	5.092E 14	5.014E 14	4.936E 14
8000000	6.773E 14	6.772E 14	6.772E 14	6.772E 14	6.771E 14	6.769E 14	6.765E 14	6.760E 14	6.750E 14	6.732E 14	6.704E 14	6.666E 14	6.618E 14	6.560E 14	6.492E 14	6.424E 14
10000000	8.189E 14	8.189E 14	8.189E 14	8.189E 14	8.187E 14	8.186E 14	8.184E 14	8.180E 14	8.169E 14	8.149E 14	8.119E 14	8.079E 14	8.029E 14	7.969E 14	7.899E 14	7.829E 14

TABLE 107. INTERNAL ENERGY DENSITY (ERG/CM³) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
1000	1.837E 00	5.809E 00	1.836E 01	5.793E 01	1.821E 02	5.651E 02	1.700E 03	4.820E 03	1.277E 04	3.262E 04	8.391E 04
1050	1.851E 00	5.851E 00	1.849E 01	5.843E 01	1.843E 02	5.779E 02	1.784E 03	5.300E 03	1.477E 04	3.866E 04	9.871E 04
1100	1.867E 00	5.895E 00	1.863E 01	5.888E 01	1.859E 02	5.857E 02	1.830E 03	5.598E 03	1.634E 04	4.456E 04	1.153E 05
1150	1.892E 00	5.948E 00	1.877E 01	5.931E 01	1.874E 02	5.915E 02	1.859E 03	5.776E 03	1.742E 04	4.961E 04	1.323E 05
1200	1.946E 00	6.032E 00	1.895E 01	5.977E 01	1.883E 02	5.964E 02	1.880E 03	5.887E 03	1.811E 04	5.368E 04	1.481E 05
1250	2.071E 00	6.203E 00	1.921E 01	6.033E 01	1.903E 02	6.010E 02	1.897E 03	5.965E 03	1.856E 04	5.622E 04	1.614E 05
1300	2.323E 00	6.571E 00	1.972E 01	6.114E 01	1.920E 02	6.057E 02	1.912E 03	6.026E 03	1.882E 04	5.810E 04	1.718E 05
1350	2.720E 00	7.282E 00	2.075E 01	6.258E 01	1.944E 02	6.110E 02	1.927E 03	6.079E 03	1.911E 04	5.941E 04	1.795E 05
1400	3.184E 00	8.389E 00	2.266E 01	6.530E 01	1.983E 02	6.179E 02	1.944E 03	6.129E 03	1.930E 04	6.037E 04	1.852E 05
1450	3.610E 00	9.736E 00	2.365E 01	7.021E 01	2.032E 02	6.283E 02	1.963E 03	6.181E 03	1.947E 04	6.112E 04	1.893E 05
1500	4.052E 00	1.105E 01	2.445E 01	7.796E 01	2.173E 02	6.453E 02	1.991E 03	6.238E 03	1.964E 04	6.176E 04	1.925E 05
1550	4.229E 00	1.217E 01	3.345E 01	8.829E 01	2.365E 02	6.738E 02	2.032E 03	6.311E 03	1.982E 04	6.233E 04	1.951E 05
1600	4.452E 00	1.306E 01	3.707E 01	9.995E 01	2.632E 02	7.190E 02	2.097E 03	6.411E 03	2.002E 04	6.289E 04	1.973E 05
1650	4.614E 00	1.384E 01	4.013E 01	1.114E 02	2.935E 02	7.642E 02	2.199E 03	6.558E 03	2.027E 04	6.348E 04	1.992E 05
1700	4.719E 00	1.442E 01	4.268E 01	1.216E 02	3.298E 02	8.680E 02	2.349E 03	6.780E 03	2.060E 04	6.415E 04	2.011E 05
1750	4.787E 00	1.482E 01	4.474E 01	1.302E 02	3.626E 02	9.642E 02	2.551E 03	7.106E 03	2.108E 04	6.497E 04	2.031E 05
1800	4.833E 00	1.509E 01	4.629E 01	1.375E 02	3.920E 02	1.064E 03	2.800E 03	7.561E 03	2.177E 04	6.603E 04	2.053E 05
1850	4.871E 00	1.528E 01	4.739E 01	1.434E 02	4.174E 02	1.160E 03	3.080E 03	8.151E 03	2.273E 04	6.746E 04	2.078E 05
1900	4.910E 00	1.541E 01	4.814E 01	1.478E 02	4.388E 02	1.247E 03	3.370E 03	8.863E 03	2.402E 04	6.942E 04	2.110E 05
1950	4.956E 00	1.554E 01	4.865E 01	1.510E 02	4.562E 02	1.323E 03	3.652E 03	9.659E 03	2.565E 04	7.206E 04	2.150E 05
2000	5.022E 00	1.567E 01	4.913E 01	1.533E 02	4.695E 02	1.388E 03	3.913E 03	1.050E 04	2.762E 04	7.551E 04	2.203E 05
2200	5.875E 00	1.695E 01	5.131E 01	1.593E 02	4.977E 02	1.543E 03	4.666E 03	1.350E 04	3.699E 04	9.750E 04	2.601E 05
2400	7.763E 00	2.147E 01	5.928E 01	1.710E 02	5.197E 02	1.611E 03	5.005E 03	1.528E 04	4.487E 04	1.246E 05	3.304E 05
2600	9.114E 00	2.680E 01	7.573E 01	2.077E 02	5.802E 02	1.707E 03	5.222E 03	1.616E 04	4.945E 04	1.459E 05	4.073E 05
2800	9.715E 00	2.992E 01	8.952E 01	2.574E 02	7.113E 02	1.956E 03	5.618E 03	1.692E 04	5.204E 04	1.588E 05	4.675E 05
3000	1.005E 01	3.132E 01	9.695E 01	2.931E 02	8.522E 02	2.373E 03	6.493E 03	1.838E 04	5.472E 04	1.671E 05	5.066E 05
3200	1.082E 01	3.263E 01	1.009E 02	3.122E 02	9.482E 02	2.772E 03	7.745E 03	2.117E 04	5.952E 04	1.760E 05	5.341E 05
3400	1.271E 01	3.593E 01	1.061E 02	3.247E 02	1.002E 03	3.043E 03	8.895E 03	2.484E 04	6.783E 04	1.907E 05	5.626E 05
3600	1.494E 01	4.222E 01	1.184E 02	3.447E 02	1.044E 03	3.207E 03	9.703E 03	2.823E 04	7.643E 04	2.142E 05	6.048E 05
3800	1.646E 01	4.851E 01	1.378E 02	3.857E 02	1.113E 03	3.349E 03	1.023E 04	3.073E 04	8.850E 04	2.443E 05	6.690E 05
4000	1.739E 01	5.276E 01	1.558E 02	4.432E 02	1.246E 03	3.569E 03	1.069E 04	3.247E 04	9.658E 04	2.747E 05	7.521E 05
4200	1.837E 01	5.559E 01	1.802E 02	4.957E 02	1.408E 03	3.941E 03	1.136E 04	3.398E 04	1.025E 05	3.005E 05	8.412E 05
4400	2.002E 01	5.878E 01	1.771E 02	5.337E 02	1.565E 03	4.427E 03	1.241E 04	3.590E 04	1.074E 05	3.206E 05	9.231E 05
4600	2.216E 01	6.382E 01	1.871E 02	5.621E 02	1.684E 03	4.899E 03	1.378E 04	3.876E 04	1.129E 05	3.370E 05	9.916E 05
4800	2.403E 01	7.013E 01	2.018E 02	5.923E 02	1.776E 03	5.281E 03	1.520E 04	4.256E 04	1.205E 05	3.533E 05	1.048E 06
5000	2.543E 01	7.584E 01	2.203E 02	6.343E 02	1.866E 03	5.579E 03	1.643E 04	4.673E 04	1.306E 05	3.733E 05	1.099E 06
6000	2.835E 01	8.832E 01	2.755E 02	8.499E 02	2.563E 03	7.509E 03	2.154E 04	6.228E 04	1.829E 05	5.306E 05	1.493E 06
7000	3.101E 01	9.699E 01	3.003E 02	9.255E 02	2.867E 03	8.892E 03	2.720E 04	8.083E 04	2.330E 05	6.855E 05	1.924E 06
8000	3.188E 01	1.007E 02	3.179E 02	9.990E 02	3.112E 03	9.603E 03	2.959E 04	9.136E 04	2.787E 05	8.252E 05	2.367E 06

90C00	3-250E 01	1-030E 02	3-257E 02	1-029E 03	3-248E 03	1-021E 04	3-101E 04	9-812E 04	3-817E 05	9-249E 05	2-782E 06
100C00	3-327E 01	1-052E 02	3-327E 02	1-052E 03	3-325E 03	1-050E 04	3-311E 04	1-030E 05	3-221E 05	9-897E 05	3-029E 06
150C00	3-673E 01	1-161E 02	3-672E 02	1-161E 03	3-672E 03	1-161E 04	3-671E 04	1-161E 05	3-670E 05	1-160E 06	3-661E 06
200C00	4-192E 01	1-294E 02	4-054E 02	1-277E 03	4-031E 03	1-273E 04	4-020E 04	1-270E 05	4-016E 05	1-269E 06	4-012E 06
300C00	1-381E 02	3-965E 02	1-097E 03	3-068E 03	8-970E 03	2-669E 04	7-703E 04	2-698E 05	5-644E 05	1-607E 06	4-845E 06
400C00	1-750E 02	5-476E 02	1-694E 03	5-197E 03	1-600E 04	4-930E 04	1-409E 05	4-298E 05	1-188E 06	3-303E 06	9-478E 06
500C00	1-953E 02	5-859E 02	1-852E 03	5-854E 03	1-847E 04	5-810E 04	1-812E 05	5-802E 05	1-787E 06	5-208E 06	1-554E 07
600C00	1-944E 02	6-148E 02	1-944E 03	6-148E 03	1-944E 04	6-147E 04	1-943E 05	6-133E 05	1-930E 06	6-031E 06	1-060E 07
800C00	2-127E 02	6-720E 02	2-127E 03	6-726E 03	2-127E 04	6-724E 04	2-127E 05	6-724E 05	2-127E 06	6-724E 06	2-125E 07
1000C00	2-310E 02	7-305E 02	2-310E 03	7-305E 03	2-310E 04	7-305E 04	2-310E 05	7-304E 05	2-310E 06	7-304E 06	2-309E 07
1500C00	2-774E 02	8-760E 02	2-768E 03	8-751E 03	2-767E 04	8-750E 04	2-767E 05	8-750E 05	2-767E 06	8-750E 06	2-767E 07
2000C00	3-261E 02	1-031E 03	3-259E 03	1-030E 04	3-252E 04	1-026E 05	3-239E 05	1-022E 06	3-228E 06	1-020E 07	3-224E 07
3000C00	4-176E 02	1-321E 03	4-176E 03	1-321E 04	4-176E 04	1-321E 05	4-176E 05	1-321E 06	4-176E 06	1-320E 07	4-174E 07
4000C00	5-091E 02	1-610E 03	5-091E 03	1-610E 04	5-091E 04	1-610E 05	5-091E 05	1-610E 06	5-091E 06	1-610E 07	5-091E 07
5000C00	6-007E 02	1-899E 03	6-007E 03	1-899E 04	6-007E 04	1-899E 05	6-007E 05	1-899E 06	6-007E 06	1-899E 07	6-007E 07
6000C00	6-922E 02	2-189E 03	6-922E 03	2-189E 04	6-922E 04	2-189E 05	6-922E 05	2-189E 06	6-922E 06	2-189E 07	6-922E 07
8000C00	8-753E 02	2-768E 03	8-753E 03	2-768E 04	8-753E 04	2-768E 05	8-753E 05	2-768E 06	8-753E 06	2-768E 07	8-753E 07
10000C00	1-058E 03	3-347E 03	1-058E 04	3-347E 04	1-058E 05	3-347E 05	1-058E 06	3-347E 06	1-058E 07	3-347E 07	1-058E 08

TABLE 107(CUNT) INTERNAL ENERGY DENSITY (ERG/CM3) OF EQUILIBRIUM AIR

TEPP. (DEC K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
10000	2.242E 05	6.277E 05	1.832E 06	5.493E 06	1.672E 07	5.073E 07	1.493E 08	4.15CF 08	1.095E 09	2.840E 09
10500	2.564E 05	6.945E 05	1.969E 06	5.794E 06	1.746E 07	5.305E 07	1.588E 08	4.549E 08	1.229E 09	3.207E 09
11000	2.955E 05	7.783E 05	2.143E 06	6.163E 06	1.830E 07	5.532E 07	1.699E 08	4.890E 08	1.356E 09	3.585E 09
11500	3.400E 05	8.792E 05	2.357E 06	6.612E 06	1.928E 07	5.773E 07	1.743E 08	5.181E 08	1.472E 09	3.963E 09
12000	3.873E 05	9.950E 05	2.612E 06	7.131E 06	2.044E 07	6.040E 07	1.816E 08	5.438E 08	1.575E 09	4.327E 09
12500	4.341E 05	1.122E 06	2.906E 06	7.786E 06	2.180E 07	6.342E 07	1.892E 08	5.677E 08	1.667E 09	4.671E 09
13000	4.771E 05	1.253E 06	3.233E 06	8.516E 06	2.337E 07	6.686E 07	1.974E 08	5.909E 08	1.751E 09	4.990E 09
13500	5.141E 05	1.382E 06	3.583E 06	9.334E 06	2.516E 07	7.076E 07	2.063E 08	6.146E 08	1.829E 09	5.285E 09
14000	5.442E 05	1.502E 06	3.943E 06	1.023E 07	2.717E 07	7.517E 07	2.163E 08	6.393E 08	1.904E 09	5.559E 09
14500	5.678E 05	1.610E 06	4.301E 06	1.118E 07	2.939E 07	8.008E 07	2.273E 08	6.658E 08	1.979E 09	5.817E 09
15000	5.861E 05	1.701E 06	4.642E 06	1.216E 07	3.177E 07	8.549E 07	2.394E 08	6.943E 08	2.055E 09	6.065E 09
15500	6.002E 05	1.777E 06	4.957E 06	1.314E 07	3.430E 07	9.136E 07	2.526E 08	7.251E 08	2.134E 09	6.308E 09
16000	6.114E 05	1.838E 06	5.238E 06	1.410E 07	3.693E 07	9.765E 07	2.670E 08	7.583E 08	2.217E 09	6.550E 09
16500	6.205E 05	1.888E 06	5.483E 06	1.502E 07	3.959E 07	1.043E 08	2.824E 08	7.941E 08	2.303E 09	6.795E 09
17000	6.283E 05	1.929E 06	5.693E 06	1.587E 07	4.226E 07	1.112E 08	2.989E 08	8.324E 08	2.398E 09	7.047E 09
17500	6.352E 05	1.962E 06	5.871E 06	1.665E 07	4.486E 07	1.183E 08	3.162E 08	8.731E 08	2.496E 09	7.307E 09
18000	6.418E 05	1.991E 06	6.021E 06	1.735E 07	4.737E 07	1.255E 08	3.362E 08	9.160E 08	2.600E 09	7.577E 09
18500	6.484E 05	2.017E 06	6.149E 06	1.797E 07	4.975E 07	1.327E 08	3.528E 08	9.611E 08	2.709E 09	7.858E 09
19000	6.553E 05	2.040E 06	6.259E 06	1.852E 07	5.197E 07	1.397E 08	3.718E 08	1.008E 09	2.823E 09	8.156E 09
19500	6.630E 05	2.063E 06	6.356E 06	1.900E 07	5.403E 07	1.466E 08	3.910E 08	1.056E 09	2.942E 09	8.468E 09
20000	6.721E 05	2.085E 06	6.443E 06	1.942E 07	5.591E 07	1.533E 08	4.102E 08	1.106E 09	3.065E 09	8.793E 09
22000	7.358E 05	2.202E 06	6.761E 06	2.072E 07	6.187E 07	1.767E 08	4.846E 08	1.311E 09	3.591E 09	1.020E 10
24000	8.743E 05	2.433E 06	7.179E 06	2.182E 07	6.613E 07	1.947E 08	5.500E 08	1.511E 09	4.149E 09	1.171E 10
26000	1.082E 06	2.861E 06	7.421E 06	2.321E 07	6.988E 07	2.088E 08	6.046E 08	1.694E 09	4.693E 09	1.323E 10
28000	1.301E 06	3.452E 06	9.148E 06	2.541E 07	7.432E 07	2.215E 08	6.507E 08	1.857E 09	5.203E 09	1.470E 10
30000	1.478E 06	4.075E 06	1.078E 07	2.876E 07	8.058E 07	2.354E 08	6.932E 08	2.004E 09	5.672E 09	1.608E 10
32000	1.604E 06	4.612E 06	1.255E 07	3.314E 07	8.944E 07	2.531E 08	7.373E 08	2.142E 09	6.110E 09	1.739E 10
34000	1.696E 06	5.024E 06	1.417E 07	3.803E 07	1.008E 08	2.763E 08	7.883E 08	2.283E 09	6.531E 09	1.864E 10
36000	1.788E 06	5.340E 06	1.552E 07	4.283E 07	1.140E 08	3.054E 08	8.501E 08	2.435E 09	6.955E 09	1.986E 10
38000	1.904E 06	5.627E 06	1.661E 07	4.714E 07	1.276E 08	3.395E 08	9.248E 08	2.607E 09	7.400E 09	2.110E 10
40000	2.072E 06	5.957E 06	1.756E 07	5.082E 07	1.406E 08	3.763E 08	1.012E 09	2.803E 09	7.882E 09	2.238E 10
42000	2.293E 06	6.391E 06	1.852E 07	5.403E 07	1.526E 08	4.137E 08	1.108E 09	3.026E 09	8.413E 09	2.373E 10
44000	2.545E 06	6.956E 06	1.966E 07	5.704E 07	1.633E 08	4.498E 08	1.209E 09	3.272E 09	8.996E 09	2.518E 10
46000	2.796E 06	7.630E 06	2.107E 07	6.020E 07	1.731E 08	4.838E 08	1.311E 09	3.535E 09	9.632E 09	2.674E 10
48000	3.023E 06	8.353E 06	2.278E 07	6.380E 07	1.827E 08	5.156E 08	1.412E 09	3.809E 09	1.031E 10	2.840E 10
50000	3.218E 06	9.062E 06	2.472E 07	6.805E 07	1.926E 08	5.458E 08	1.509E 09	4.087E 09	1.103E 10	3.016E 10
60000	4.165E 06	1.188E 07	3.414E 07	9.533E 07	2.601E 08	7.103E 08	1.968E 09	5.441E 09	1.481E 10	4.000E 10
70000	5.531E 06	1.550E 07	4.300E 07	1.200E 08	3.390E 08	9.290E 08	2.516E 09	6.858E 09	1.873E 10	5.580E 10
80000	6.731E 06	1.925E 07	5.435E 07	1.503E 08	4.153E 08	1.151E 09	3.147E 09	8.517E 09	2.308E 10	6.258E 10

YUNUW	0.007E 00	2.672E 07	7.941E 07	2.134E 08	5.963E 08	1.638E 09	4.459E 09	1.211E 10	1.287E 10	0.880E 10
100000	0.143E 04	2.675E 07	7.941E 07	2.134E 08	5.963E 08	1.638E 09	4.459E 09	1.211E 10	1.287E 10	0.880E 10
150000	1.133E 07	3.604E 07	1.113E 08	3.370E 08	1.003E 09	2.889E 09	8.644E 09	2.210E 10	5.993E 10	1.420E 11
200000	1.267E 07	4.000E 07	1.259E 08	3.942E 08	1.220E 09	3.699E 09	1.091E 10	3.114E 10	8.442E 10	2.354E 11
300000	1.504E 07	4.719E 07	1.485E 08	4.673E 08	1.467E 09	4.579E 09	1.413E 10	4.272E 10	1.234E 11	3.554E 11
400000	2.704E 07	7.401E 07	2.812E 08	9.760E 08	1.734E 09	5.352E 09	1.656E 10	5.001E 10	1.330E 11	4.475E 11
500000	4.423E 07	1.217E 08	3.307E 08	9.515E 08	2.608E 09	7.110E 09	2.022E 10	5.909E 10	1.793E 11	5.349E 11
600000	5.648E 07	1.708E 08	4.990E 08	1.392E 09	3.817E 09	1.055E 10	2.805E 10	7.830E 10	2.190E 11	6.292E 11
800000	6.708E 07	2.111E 08	6.591E 08	2.027E 09	6.112E 09	1.795E 10	5.054E 10	1.380E 11	3.733E 11	1.091E 12
1000000	7.301E 07	2.308E 08	7.287E 08	2.296E 09	7.191E 09	2.223E 10	6.716E 10	1.967E 11	5.335E 11	1.503E 12
1500000	8.748E 07	2.766E 08	8.743E 08	2.763E 09	8.727E 09	2.753E 10	8.608E 10	2.788E 11	8.354E 11	2.313E 12
2000000	1.019E 08	3.223E 08	1.019E 09	3.221E 09	1.010E 10	3.214E 10	1.013E 11	3.180E 11	9.979E 11	3.093E 12
3000000	1.319E 08	4.164E 08	1.315E 09	4.160E 09	1.309E 10	4.133E 10	1.304E 11	4.111E 11	1.293E 12	4.050E 12
4000000	1.610E 08	5.091E 08	1.609E 09	5.088E 09	1.607E 10	5.075E 10	1.600E 11	5.042E 11	1.586E 12	4.901E 12
5000000	1.899E 08	6.004E 08	1.899E 09	6.003E 09	1.890E 10	5.999E 10	1.893E 11	5.979E 11	1.883E 12	5.910E 12
6000000	2.189E 08	6.921E 08	2.189E 09	6.920E 09	2.180E 10	6.916E 10	2.185E 11	6.902E 11	2.177E 12	6.853E 12
8000000	2.765E 08	8.752E 08	2.768E 09	8.751E 09	2.767E 10	8.748E 10	2.762E 11	8.734E 11	2.758E 12	8.698E 12
10000000	3.347E 08	1.059E 09	3.346E 09	1.059E 10	3.346E 10	1.059E 11	3.344E 11	1.057E 12	3.338E 12	1.054E 13

TABLE 108. ENTHALPY (ERG/GM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
10500	1.536E 12	1.536E 12	1.535E 12	1.532E 12	1.522E 12	1.495E 12	1.424E 12	1.280E 12	1.070E 12	8.775E 11	7.204E 11
10500	1.552E 12	1.552E 12	1.551E 12	1.550E 12	1.546E 12	1.533E 12	1.497E 12	1.409E 12	1.246E 12	1.030E 12	8.447E 11
11000	1.570E 12	1.568E 12	1.567E 12	1.566E 12	1.564E 12	1.550E 12	1.515E 12	1.491E 12	1.379E 12	1.194E 12	9.844E 11
11500	1.596E 12	1.597E 12	1.594E 12	1.593E 12	1.592E 12	1.578E 12	1.549E 12	1.542E 12	1.472E 12	1.330E 12	1.120E 12
12000	1.644E 12	1.614E 12	1.603E 12	1.600E 12	1.598E 12	1.596E 12	1.591E 12	1.574E 12	1.535E 12	1.435E 12	1.262E 12
12500	1.750E 12	1.642E 12	1.630E 12	1.619E 12	1.615E 12	1.613E 12	1.610E 12	1.602E 12	1.577E 12	1.512E 12	1.376E 12
13000	1.958E 12	1.761E 12	1.676E 12	1.645E 12	1.635E 12	1.631E 12	1.628E 12	1.623E 12	1.608E 12	1.564E 12	1.447E 12
13500	2.282E 12	1.947E 12	1.764E 12	1.687E 12	1.659E 12	1.650E 12	1.644E 12	1.641E 12	1.632E 12	1.605E 12	1.535E 12
14000	2.681E 12	2.234E 12	1.923E 12	1.762E 12	1.656E 12	1.672E 12	1.664E 12	1.660E 12	1.653E 12	1.635E 12	1.587E 12
14500	3.010E 12	2.583E 12	2.149E 12	1.892E 12	1.757E 12	1.704E 12	1.685E 12	1.678E 12	1.672E 12	1.660E 12	1.627E 12
15000	3.292E 12	2.925E 12	2.482E 12	2.095E 12	1.859E 12	1.753E 12	1.713E 12	1.698E 12	1.691E 12	1.681E 12	1.658E 12
15500	3.522E 12	3.217E 12	2.810E 12	2.364E 12	2.020E 12	1.831E 12	1.751E 12	1.722E 12	1.710E 12	1.702E 12	1.684E 12
16000	3.709E 12	3.457E 12	3.109E 12	2.668E 12	2.251E 12	1.952E 12	1.809E 12	1.753E 12	1.732E 12	1.721E 12	1.707E 12
16500	3.847E 12	3.656E 12	3.363E 12	2.966E 12	2.508E 12	2.124E 12	1.897E 12	1.796E 12	1.757E 12	1.742E 12	1.729E 12
17000	3.940E 12	3.811E 12	3.576E 12	3.233E 12	2.792E 12	2.344E 12	2.023E 12	1.858E 12	1.790E 12	1.764E 12	1.750E 12
17500	4.002E 12	3.923E 12	3.750E 12	3.463E 12	3.044E 12	2.597E 12	2.193E 12	1.947E 12	1.834E 12	1.790E 12	1.771E 12
18000	4.048E 12	3.999E 12	3.883E 12	3.656E 12	3.309E 12	2.859E 12	2.401E 12	2.069E 12	1.895E 12	1.823E 12	1.794E 12
18500	4.086E 12	4.054E 12	3.979E 12	3.813E 12	3.522E 12	3.111E 12	2.634E 12	2.226E 12	1.978E 12	1.865E 12	1.820E 12
19000	4.125E 12	4.097E 12	4.048E 12	3.934E 12	3.703E 12	3.341E 12	2.876E 12	2.415E 12	2.088E 12	1.920E 12	1.850E 12
19500	4.171E 12	4.137E 12	4.100E 12	4.023E 12	3.851E 12	3.544E 12	3.112E 12	2.626E 12	2.237E 12	1.994E 12	1.869E 12
20000	4.231E 12	4.178E 12	4.144E 12	4.090E 12	3.967E 12	3.719E 12	3.331E 12	2.847E 12	2.392E 12	2.088E 12	1.937E 12
22000	4.948E 12	4.534E 12	4.351E 12	4.276E 12	4.227E 12	4.148E 12	3.973E 12	3.648E 12	3.183E 12	2.679E 12	2.284E 12
24000	6.502E 12	5.717E 12	5.025E 12	4.616E 12	4.434E 12	4.354E 12	4.280E 12	4.145E 12	3.855E 12	3.407E 12	2.884E 12
26000	7.628E 12	7.114E 12	6.386E 12	5.576E 12	4.937E 12	4.631E 12	4.488E 12	4.397E 12	4.241E 12	3.988E 12	3.541E 12
28000	8.154E 12	7.950E 12	7.338E 12	6.880E 12	6.050E 12	5.300E 12	4.650E 12	4.425E 12	4.504E 12	4.353E 12	4.064E 12
30000	8.469E 12	8.347E 12	8.179E 12	7.834E 12	7.229E 12	6.403E 12	5.583E 12	5.030E 12	4.753E 12	4.599E 12	4.418E 12
32000	9.126E 12	8.723E 12	8.536E 12	8.364E 12	8.047E 12	7.464E 12	6.635E 12	5.779E 12	5.176E 12	4.861E 12	4.615E 12
34000	1.069E 13	9.604E 12	9.004E 12	8.726E 12	8.525E 12	8.201E 12	7.609E 12	6.759E 12	5.805E 12	5.270E 12	4.940E 12
36000	1.253E 13	1.125E 13	1.003E 13	9.276E 12	8.908E 12	8.664E 12	8.366E 12	7.671E 12	6.766E 12	5.911E 12	5.315E 12
38000	1.390E 13	1.290E 13	1.144E 13	1.036E 13	9.505E 12	9.047E 12	8.775E 12	8.358E 12	7.452E 12	6.725E 12	5.874E 12
40000	1.459E 13	1.403E 13	1.313E 13	1.188E 13	1.037E 13	9.672E 12	9.193E 12	8.647E 12	8.366E 12	7.548E 12	6.584E 12
42000	1.544E 13	1.480E 13	1.419E 13	1.326E 13	1.198E 13	1.067E 13	9.771E 12	9.275E 12	8.868E 12	8.255E 12	7.357E 12
44000	1.622E 13	1.567E 13	1.496E 13	1.429E 13	1.339E 13	1.196E 13	1.067E 13	9.811E 12	9.309E 12	8.816E 12	8.068E 12
46000	1.860E 13	1.700E 13	1.592E 13	1.506E 13	1.431E 13	1.321E 13	1.183E 13	1.059E 13	9.801E 12	9.282E 12	8.611E 12
48000	2.014E 13	1.866E 13	1.704E 13	1.589E 13	1.510E 13	1.424E 13	1.303E 13	1.161E 13	1.046E 13	9.744E 12	9.175E 12
50000	2.134E 13	2.018E 13	1.860E 13	1.701E 13	1.588E 13	1.506E 13	1.407E 13	1.273E 13	1.133E 13	1.030E 13	9.636E 12
60000	2.401E 13	2.367E 13	2.202E 13	2.101E 13	2.020E 13	1.949E 13	1.849E 13	1.699E 13	1.504E 13	1.460E 13	1.308E 13
70000	2.648E 13	2.621E 13	2.549E 13	2.507E 13	2.459E 13	2.414E 13	2.339E 13	2.205E 13	2.020E 13	1.835E 13	1.687E 13
80000	2.732E 13	2.750E 13	2.744E 13	2.728E 13	2.690E 13	2.629E 13	2.566E 13	2.502E 13	2.424E 13	2.278E 13	2.078E 13

98000	2.8418	13	6.8748	13	2.9308	13	2.9298	13	2.9268	13	2.9178	13	2.8978	13	6.8728	13	3.3712	13	3.3458	13
100000	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13	2.9308	13
150000	3.3768	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13	3.3758	13
200000	3.9408	13	3.8798	13	3.8498	13	3.8318	13	3.8208	13	3.8228	13	3.8208	13	3.8198	13	3.8178	13	3.8158	13
300000	1.7038	14	1.1018	14	0.7538	13	0.1918	13	7.7258	13	7.1298	13	0.2678	13	9.4408	13	9.0128	13	8.0218	13
400000	1.5438	14	1.3288	14	1.4978	14	1.4228	14	1.3098	14	1.3328	14	1.2278	14	1.0008	14	9.7208	13	8.9348	13
500000	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14	1.6498	14
600000	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14	1.7878	14
800000	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14	2.0238	14
1000000	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14	2.2598	14
1200000	2.8548	14	2.8518	14	2.8508	14	2.8498	14	2.8498	14	2.8498	14	2.8498	14	2.8498	14	2.8498	14	2.8498	14
1400000	3.4478	14	3.4478	14	3.4408	14	3.4408	14	3.4408	14	3.4408	14	3.4408	14	3.4408	14	3.4408	14	3.4408	14
1600000	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14	4.0408	14
1800000	5.6288	14	5.6208	14	5.6208	14	5.6208	14	5.6208	14	5.6208	14	5.6208	14	5.6208	14	5.6208	14	5.6208	14
2000000	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14	7.0098	14
2200000	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14	8.1898	14
2400000	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15	1.0558	15
2600000	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15
2800000	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15
3000000	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15	1.2918	15

TABLE 108(CONT) ENTHALPY (ERG/CM) OF EQUILIBRIUM AIR

TEMP. (DEG K)	LOG DENSITY RATIO									
	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
10500	4.141E 11	5.477E 11	5.078E 11	4.936E 11	4.668E 11	4.409E 11	4.195E 11	3.710E 11	3.137E 11	2.615E 11
10800	7.004E 11	6.031E 11	5.462E 11	5.108E 11	4.885E 11	4.704E 11	4.449E 11	4.071E 11	3.512E 11	2.939E 11
11000	8.040E 11	6.766E 11	5.941E 11	5.366E 11	5.128E 11	4.917E 11	4.704E 11	4.378E 11	3.809E 11	3.275E 11
11500	9.237E 11	7.624E 11	6.524E 11	5.931E 11	5.408E 11	5.140E 11	4.924E 11	4.644E 11	4.190E 11	3.611E 11
12000	1.050E 12	8.610E 11	7.216E 11	6.301E 11	5.735E 11	5.384E 11	5.130E 11	4.802E 11	4.454E 11	3.930E 11
12500	1.176E 12	9.688E 11	8.012E 11	6.922E 11	6.114E 11	5.658E 11	5.360E 11	5.104E 11	4.762E 11	4.240E 11
13000	1.293E 12	1.081E 12	8.897E 11	7.604E 11	6.551E 11	5.967E 11	5.599E 11	5.321E 11	5.004E 11	4.539E 11
13500	1.394E 12	1.192E 12	9.847E 11	8.391E 11	7.047E 11	6.316E 11	5.850E 11	5.542E 11	5.235E 11	4.809E 11
14000	1.478E 12	1.296E 12	1.083E 12	9.062E 11	7.602E 11	6.707E 11	6.143E 11	5.771E 11	5.457E 11	5.042E 11
14500	1.545E 12	1.399E 12	1.181E 12	9.783E 11	8.212E 11	7.141E 11	6.454E 11	6.015E 11	5.676E 11	5.302E 11
15000	1.598E 12	1.470E 12	1.275E 12	1.063E 12	8.870E 11	7.617E 11	6.800E 11	6.276E 11	5.902E 11	5.535E 11
15500	1.640E 12	1.538E 12	1.342E 12	1.149E 12	9.568E 11	8.134E 11	7.174E 11	6.594E 11	6.134E 11	5.759E 11
16000	1.674E 12	1.594E 12	1.440E 12	1.233E 12	1.029E 12	8.687E 11	7.578E 11	6.857E 11	6.376E 11	5.965E 11
16500	1.703E 12	1.640E 12	1.510E 12	1.314E 12	1.103E 12	9.272E 11	8.012E 11	7.160E 11	6.631E 11	6.213E 11
17000	1.729E 12	1.679E 12	1.570E 12	1.390E 12	1.177E 12	9.881E 11	8.473E 11	7.524E 11	6.900E 11	6.444E 11
17500	1.752E 12	1.712E 12	1.622E 12	1.459E 12	1.250E 12	1.051E 12	8.959E 11	7.699E 11	7.195E 11	6.686E 11
18000	1.774E 12	1.741E 12	1.667E 12	1.523E 12	1.321E 12	1.114E 12	9.445E 11	8.275E 11	7.400E 11	6.934E 11
18500	1.794E 12	1.767E 12	1.705E 12	1.579E 12	1.388E 12	1.178E 12	9.908E 11	8.678E 11	7.793E 11	7.191E 11
19000	1.819E 12	1.792E 12	1.739E 12	1.630E 12	1.451E 12	1.241E 12	1.052E 12	9.090E 11	8.119E 11	7.442E 11
19500	1.845E 12	1.816E 12	1.770E 12	1.675E 12	1.511E 12	1.303E 12	1.107E 12	9.531E 11	8.459E 11	7.742E 11
20000	1.873E 12	1.840E 12	1.798E 12	1.715E 12	1.565E 12	1.363E 12	1.161E 12	9.977E 11	8.811E 11	8.039E 11
20500	2.059E 12	1.936E 12	1.902E 12	1.844E 12	1.743E 12	1.578E 12	1.374E 12	1.182E 12	1.031E 12	9.304E 11
21000	2.440E 12	2.166E 12	2.031E 12	1.956E 12	1.876E 12	1.748E 12	1.565E 12	1.365E 12	1.191E 12	1.066E 12
21500	3.005E 12	2.540E 12	2.245E 12	2.091E 12	1.995E 12	1.866E 12	1.729E 12	1.536E 12	1.349E 12	1.204E 12
22000	3.600E 12	3.052E 12	2.587E 12	2.294E 12	2.132E 12	2.013E 12	1.871E 12	1.691E 12	1.499E 12	1.339E 12
22500	4.093E 12	3.593E 12	3.038E 12	2.593E 12	2.316E 12	2.149E 12	2.004E 12	1.833E 12	1.640E 12	1.448E 12
23000	4.450E 12	4.066E 12	3.526E 12	2.979E 12	2.570E 12	2.316E 12	2.140E 12	1.968E 12	1.773E 12	1.592E 12
23500	4.722E 12	4.434E 12	3.980E 12	3.409E 12	2.892E 12	2.530E 12	2.295E 12	2.105E 12	1.902E 12	1.711E 12
24000	4.986E 12	4.728E 12	4.363E 12	3.835E 12	3.260E 12	2.794E 12	2.478E 12	2.251E 12	2.032E 12	1.829E 12
24500	5.323E 12	4.994E 12	4.679E 12	4.222E 12	3.644E 12	3.100E 12	2.695E 12	2.414E 12	2.148E 12	1.948E 12
25000	5.793E 12	5.299E 12	4.951E 12	4.558E 12	4.016E 12	3.431E 12	2.945E 12	2.598E 12	2.314E 12	2.072E 12
25500	6.400E 12	5.688E 12	5.241E 12	4.855E 12	4.359E 12	3.768E 12	3.221E 12	2.804E 12	2.472E 12	2.201E 12
26000	7.090E 12	6.185E 12	5.568E 12	5.135E 12	4.671E 12	4.094E 12	3.512E 12	3.030E 12	2.645E 12	2.339E 12
26500	7.780E 12	6.775E 12	5.969E 12	5.428E 12	4.940E 12	4.400E 12	3.807E 12	3.272E 12	2.833E 12	2.486E 12
27000	8.409E 12	7.407E 12	6.449E 12	5.798E 12	5.241E 12	4.703E 12	4.099E 12	3.523E 12	3.032E 12	2.642E 12
27500	8.950E 12	8.030E 12	6.991E 12	6.141E 12	5.533E 12	4.984E 12	4.383E 12	3.762E 12	3.242E 12	2.807E 12
28000	1.163E 13	1.036E 13	9.649E 12	8.598E 12	7.471E 12	6.510E 12	5.742E 12	5.045E 12	4.350E 12	3.720E 12
28500	1.542E 13	1.376E 13	1.210E 13	1.091E 13	9.736E 12	8.505E 12	7.348E 12	6.376E 12	5.530E 12	4.746E 12
29000	1.881E 13	1.711E 13	1.538E 13	1.356E 13	1.195E 13	1.055E 13	9.191E 12	7.924E 12	6.827E 12	5.850E 12

150000	3.351E 13	3.316E 13	3.243E 13	3.110E 13	2.937E 13	2.808E 13	2.688E 13	2.580E 13	2.481E 13	2.392E 13	2.313E 13	2.244E 13
200000	3.811E 13	3.803E 13	3.709E 13	3.740E 13	3.670E 13	3.524E 13	3.324E 13	3.279E 13	3.208E 13	3.149E 13	3.092E 13	3.036E 13
300000	4.749E 13	4.717E 13	4.690E 13	4.674E 13	4.640E 13	4.560E 13	4.436E 13	4.369E 13	4.276E 13	4.205E 13	4.148E 13	4.092E 13
400000	5.177E 13	7.234E 13	6.389E 13	5.800E 13	5.662E 13	5.541E 13	5.430E 13	5.329E 13	5.238E 13	5.147E 13	5.056E 13	4.965E 13
500000	1.300E 14	1.151E 14	1.030E 14	9.317E 13	8.264E 13	7.316E 13	6.709E 13	6.351E 13	6.050E 13	5.808E 13	5.601E 13	5.401E 13
600000	1.663E 14	1.594E 14	1.484E 14	1.332E 14	1.170E 14	1.052E 14	9.307E 13	8.205E 13	7.413E 13	6.822E 13	6.328E 13	5.928E 13
800000	2.018E 14	2.010E 14	1.907E 14	1.939E 14	1.840E 14	1.743E 14	1.577E 14	1.389E 14	1.217E 14	1.059E 14	9.218E 13	8.022E 13
1000000	2.250E 14	2.257E 14	2.254E 14	2.266E 14	2.227E 14	2.183E 14	2.097E 14	1.961E 14	1.771E 14	1.593E 14	1.436E 13	1.298E 13
1500000	2.848E 14	2.847E 14	2.846E 14	2.845E 14	2.841E 14	2.834E 14	2.820E 14	2.791E 14	2.729E 14	2.608E 14	2.508E 14	2.408E 14
2000000	3.430E 14	3.437E 14	3.434E 14	3.435E 14	3.432E 14	3.427E 14	3.410E 14	3.401E 14	3.369E 14	3.304E 14	3.248E 14	3.192E 14
3000000	4.644E 14	4.639E 14	4.633E 14	4.635E 14	4.610E 14	4.611E 14	4.602E 14	4.589E 14	4.566E 14	4.520E 14	4.464E 14	4.408E 14
4000000	5.820E 14	5.820E 14	5.827E 14	5.823E 14	5.821E 14	5.813E 14	5.800E 14	5.783E 14	5.750E 14	5.721E 14	5.692E 14	5.663E 14
5000000	7.009E 14	7.000E 14	7.000E 14	7.007E 14	7.005E 14	7.001E 14	6.995E 14	6.982E 14	6.959E 14	6.921E 14	6.883E 14	6.845E 14
6000000	8.189E 14	8.189E 14	8.180E 14	8.187E 14	8.186E 14	8.183E 14	8.170E 14	8.160E 14	8.131E 14	8.119E 14	8.109E 14	8.099E 14
8000000	1.055E 15	1.055E 15	1.055E 15	1.055E 15	1.055E 15	1.054E 15	1.054E 15	1.054E 15	1.052E 15	1.049E 15	1.049E 15	1.049E 15
10000000	1.291E 15	1.291E 15	1.291E 15	1.291E 15	1.291E 15	1.291E 15	1.290E 15	1.290E 15	1.288E 15	1.288E 15	1.288E 15	1.288E 15

TABLE 109. EFFECTIVE GAMMA-1 - P/V/E OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
1000	0.030E-02	0.039E-02	0.040E-02	0.043E-02	0.040E-02	0.105E-02	0.232E-02	0.535E-02	9.105E-02	9.946E-02	1.051E-01
1050	0.300E-02	0.302E-02	0.303E-02	0.305E-02	0.301E-02	0.411E-02	0.472E-02	0.630E-02	9.012E-02	9.649E-02	1.051E-01
1100	0.709E-02	0.710E-02	0.721E-02	0.722E-02	0.725E-02	0.734E-02	0.764E-02	0.831E-02	9.076E-02	9.545E-02	1.031E-01
1150	0.005E-02	0.039E-02	0.050E-02	0.054E-02	0.057E-02	0.061E-02	0.074E-02	0.121E-02	9.251E-02	9.502E-02	1.015E-01
1200	0.207E-02	0.325E-02	0.365E-02	0.379E-02	0.383E-02	0.387E-02	0.394E-02	0.410E-02	9.491E-02	9.608E-02	1.012E-01
1250	0.201E-02	0.519E-02	0.645E-02	0.679E-02	0.703E-02	0.708E-02	0.713E-02	0.726E-02	9.767E-02	9.877E-02	1.011E-01
1300	0.898E-02	0.524E-02	0.042E-02	0.044E-02	1.001E-01	1.002E-01	1.003E-01	1.004E-01	1.004E-01	1.004E-01	1.003E-01
1350	0.418E-02	0.267E-02	0.076E-02	1.027E-01	1.039E-01	1.033E-01	1.034E-01	1.035E-01	1.034E-01	1.040E-01	1.051E-01
1400	7.999E-02	0.031E-02	0.081E-02	1.025E-01	1.031E-01	1.061E-01	1.064E-01	1.065E-01	1.064E-01	1.069E-01	1.077E-01
1450	7.755E-02	0.412E-02	0.301E-02	1.013E-01	1.043E-01	1.084E-01	1.092E-01	1.095E-01	1.094E-01	1.098E-01	1.103E-01
1500	7.656E-02	0.132E-02	0.089E-02	0.820E-02	1.039E-01	1.100E-01	1.110E-01	1.123E-01	1.124E-01	1.127E-01	1.130E-01
1550	7.637E-02	7.944E-02	0.572E-02	0.433E-02	1.037E-01	1.104E-01	1.137E-01	1.150E-01	1.154E-01	1.156E-01	1.158E-01
1600	7.672E-02	7.940E-02	0.384E-02	0.080E-02	1.004E-01	1.093E-01	1.140E-01	1.172E-01	1.181E-01	1.184E-01	1.184E-01
1650	7.760E-02	7.940E-02	0.299E-02	0.047E-02	0.609E-02	1.069E-01	1.140E-01	1.189E-01	1.204E-01	1.212E-01	1.214E-01
1700	7.894E-02	0.024E-02	0.202E-02	0.710E-02	0.400E-02	1.037E-01	1.134E-01	1.190E-01	1.227E-01	1.237E-01	1.241E-01
1750	0.055E-02	0.135E-02	0.317E-02	0.652E-02	0.203E-02	1.006E-01	1.109E-01	1.195E-01	1.242E-01	1.261E-01	1.268E-01
1800	0.230E-02	0.280E-02	0.400E-02	0.652E-02	0.911E-02	0.802E-02	1.006E-01	1.182E-01	1.250E-01	1.281E-01	1.293E-01
1850	0.409E-02	0.444E-02	0.521E-02	0.695E-02	0.045E-02	0.627E-02	1.052E-01	1.140E-01	1.240E-01	1.296E-01	1.314E-01
1900	0.584E-02	0.617E-02	0.660E-02	0.709E-02	0.051E-02	0.523E-02	1.029E-01	1.134E-01	1.230E-01	1.305E-01	1.330E-01
1950	0.748E-02	0.791E-02	0.031E-02	0.912E-02	0.102E-02	0.478E-02	1.012E-01	1.100E-01	1.220E-01	1.307E-01	1.352E-01
2000	0.888E-02	0.950E-02	0.000E-02	0.059E-02	0.191E-02	0.402E-02	1.001E-01	1.084E-01	1.197E-01	1.300E-01	1.343E-01
2050	0.850E-02	0.344E-02	0.591E-02	0.642E-02	0.751E-02	0.847E-02	1.005E-01	1.047E-01	1.120E-01	1.228E-01	1.347E-01
2100	0.235E-02	0.845E-02	0.547E-02	1.006E-01	1.032E-01	1.043E-01	1.053E-01	1.069E-01	1.105E-01	1.173E-01	1.270E-01
2150	0.168E-02	0.472E-02	0.979E-02	0.694E-02	1.041E-01	1.086E-01	1.107E-01	1.119E-01	1.134E-01	1.170E-01	1.237E-01
2200	0.466E-02	0.579E-02	0.019E-02	0.254E-02	0.933E-02	1.073E-01	1.135E-01	1.167E-01	1.184E-01	1.203E-01	1.240E-01
2250	0.351E-02	0.290E-02	0.025E-02	0.227E-02	0.623E-02	1.028E-01	1.112E-01	1.144E-01	1.224E-01	1.248E-01	1.270E-01
2300	0.982E-02	0.250E-02	0.376E-02	0.401E-02	0.671E-02	1.005E-01	1.071E-01	1.150E-01	1.237E-01	1.285E-01	1.312E-01
2350	0.637E-02	0.220E-02	0.015E-02	0.809E-02	0.937E-02	1.014E-01	1.054E-01	1.122E-01	1.213E-01	1.296E-01	1.346E-01
2400	0.324E-02	0.857E-02	0.491E-02	0.973E-02	1.023E-01	1.039E-01	1.062E-01	1.106E-01	1.181E-01	1.277E-01	1.359E-01
2450	0.316E-02	0.631E-02	0.150E-02	0.808E-02	1.035E-01	1.066E-01	1.086E-01	1.113E-01	1.164E-01	1.248E-01	1.347E-01
2500	0.471E-02	0.659E-02	0.978E-02	0.504E-02	1.018E-01	1.076E-01	1.110E-01	1.134E-01	1.168E-01	1.229E-01	1.323E-01
2550	0.594E-02	0.810E-02	0.019E-02	0.359E-02	0.913E-02	1.061E-01	1.120E-01	1.154E-01	1.184E-01	1.227E-01	1.302E-01
2600	0.545E-02	0.914E-02	0.154E-02	0.397E-02	0.775E-02	1.030E-01	1.110E-01	1.168E-01	1.205E-01	1.239E-01	1.295E-01
2650	0.422E-02	0.068E-02	0.256E-02	0.523E-02	0.777E-02	1.023E-01	1.090E-01	1.164E-01	1.219E-01	1.256E-01	1.300E-01
2700	0.391E-02	0.760E-02	0.226E-02	0.622E-02	0.908E-02	1.023E-01	1.074E-01	1.147E-01	1.220E-01	1.272E-01	1.313E-01
2750	0.459E-02	0.727E-02	0.132E-02	0.615E-02	1.001E-01	1.032E-01	1.071E-01	1.131E-01	1.210E-01	1.279E-01	1.320E-01
2800	0.451E-02	0.537E-02	0.610E-02	0.735E-02	0.977E-02	1.030E-01	1.093E-01	1.147E-01	1.193E-01	1.245E-01	1.321E-01
2850	1.035E-01	1.042E-01	1.055E-01	1.071E-01	1.084E-01	1.094E-01	1.114E-01	1.150E-01	1.204E-01	1.271E-01	1.330E-01
2900	1.153E-01	1.154E-01	1.155E-01	1.159E-01	1.170E-01	1.187E-01	1.204E-01	1.220E-01	1.242E-01	1.262E-01	1.345E-01

TABLE 109(CONT) EFFECTIVE GAMMA-1 - P/V/E OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
10000	1.194E-01	1.277E-01	1.337E-01	1.379E-01	1.408E-01	1.437E-01	1.464E-01	1.570E-01	1.711E-01	1.895E-01
10500	1.162E-01	1.259E-01	1.337E-01	1.394E-01	1.432E-01	1.463E-01	1.499E-01	1.564E-01	1.678E-01	1.843E-01
11000	1.129E-01	1.234E-01	1.327E-01	1.399E-01	1.450E-01	1.484E-01	1.520E-01	1.571E-01	1.681E-01	1.883E-01
11500	1.102E-01	1.207E-01	1.310E-01	1.377E-01	1.441E-01	1.504E-01	1.542E-01	1.584E-01	1.694E-01	1.776E-01
12000	1.084E-01	1.182E-01	1.289E-01	1.387E-01	1.465E-01	1.521E-01	1.562E-01	1.632E-01	1.640E-01	1.740E-01
12500	1.075E-01	1.162E-01	1.267E-01	1.373E-01	1.463E-01	1.530E-01	1.579E-01	1.620E-01	1.670E-01	1.754E-01
13000	1.074E-01	1.149E-01	1.248E-01	1.356E-01	1.456E-01	1.533E-01	1.593E-01	1.638E-01	1.684E-01	1.754E-01
13500	1.084E-01	1.144E-01	1.233E-01	1.339E-01	1.445E-01	1.532E-01	1.602E-01	1.653E-01	1.699E-01	1.740E-01
14000	1.099E-01	1.146E-01	1.223E-01	1.324E-01	1.433E-01	1.531E-01	1.608E-01	1.645E-01	1.713E-01	1.748E-01
14500	1.110E-01	1.154E-01	1.219E-01	1.313E-01	1.420E-01	1.524E-01	1.610E-01	1.675E-01	1.726E-01	1.778E-01
15000	1.141E-01	1.167E-01	1.221E-01	1.304E-01	1.408E-01	1.515E-01	1.608E-01	1.691E-01	1.737E-01	1.789E-01
15500	1.165E-01	1.184E-01	1.227E-01	1.301E-01	1.399E-01	1.506E-01	1.605E-01	1.685E-01	1.746E-01	1.799E-01
16000	1.191E-01	1.205E-01	1.238E-01	1.301E-01	1.391E-01	1.497E-01	1.599E-01	1.686E-01	1.753E-01	1.808E-01
16500	1.217E-01	1.227E-01	1.253E-01	1.306E-01	1.387E-01	1.489E-01	1.593E-01	1.685E-01	1.758E-01	1.815E-01
17000	1.244E-01	1.251E-01	1.271E-01	1.314E-01	1.386E-01	1.483E-01	1.587E-01	1.682E-01	1.740E-01	1.821E-01
17500	1.271E-01	1.274E-01	1.290E-01	1.325E-01	1.389E-01	1.478E-01	1.580E-01	1.678E-01	1.740E-01	1.824E-01
18000	1.297E-01	1.301E-01	1.312E-01	1.339E-01	1.394E-01	1.476E-01	1.575E-01	1.674E-01	1.759E-01	1.824E-01
18500	1.322E-01	1.326E-01	1.334E-01	1.354E-01	1.402E-01	1.476E-01	1.570E-01	1.669E-01	1.757E-01	1.827E-01
19000	1.347E-01	1.351E-01	1.357E-01	1.374E-01	1.413E-01	1.479E-01	1.568E-01	1.664E-01	1.754E-01	1.824E-01
19500	1.370E-01	1.376E-01	1.381E-01	1.394E-01	1.426E-01	1.484E-01	1.564E-01	1.662E-01	1.750E-01	1.820E-01
20000	1.390E-01	1.400E-01	1.405E-01	1.413E-01	1.441E-01	1.491E-01	1.567E-01	1.657E-01	1.746E-01	1.815E-01
20500	1.404E-01	1.409E-01	1.415E-01	1.422E-01	1.449E-01	1.500E-01	1.577E-01	1.668E-01	1.756E-01	1.790E-01
21000	1.424E-01	1.429E-01	1.435E-01	1.442E-01	1.469E-01	1.520E-01	1.597E-01	1.688E-01	1.776E-01	1.774E-01
21500	1.443E-01	1.448E-01	1.454E-01	1.461E-01	1.488E-01	1.539E-01	1.616E-01	1.707E-01	1.795E-01	1.774E-01
22000	1.463E-01	1.468E-01	1.474E-01	1.481E-01	1.508E-01	1.559E-01	1.636E-01	1.727E-01	1.815E-01	1.774E-01
22500	1.482E-01	1.487E-01	1.493E-01	1.500E-01	1.527E-01	1.578E-01	1.655E-01	1.746E-01	1.834E-01	1.774E-01
23000	1.502E-01	1.507E-01	1.513E-01	1.520E-01	1.547E-01	1.598E-01	1.675E-01	1.766E-01	1.854E-01	1.774E-01
23500	1.521E-01	1.526E-01	1.532E-01	1.539E-01	1.566E-01	1.617E-01	1.694E-01	1.785E-01	1.873E-01	1.774E-01
24000	1.541E-01	1.546E-01	1.552E-01	1.559E-01	1.586E-01	1.637E-01	1.714E-01	1.805E-01	1.893E-01	1.774E-01
24500	1.560E-01	1.565E-01	1.571E-01	1.578E-01	1.605E-01	1.656E-01	1.733E-01	1.824E-01	1.912E-01	1.774E-01
25000	1.580E-01	1.585E-01	1.591E-01	1.598E-01	1.625E-01	1.676E-01	1.753E-01	1.844E-01	1.932E-01	1.774E-01
25500	1.600E-01	1.605E-01	1.611E-01	1.618E-01	1.645E-01	1.696E-01	1.773E-01	1.864E-01	1.952E-01	1.774E-01
26000	1.620E-01	1.625E-01	1.631E-01	1.638E-01	1.665E-01	1.716E-01	1.793E-01	1.884E-01	1.972E-01	1.774E-01
26500	1.640E-01	1.645E-01	1.651E-01	1.658E-01	1.685E-01	1.736E-01	1.813E-01	1.904E-01	1.992E-01	1.774E-01
27000	1.660E-01	1.665E-01	1.671E-01	1.678E-01	1.705E-01	1.756E-01	1.833E-01	1.924E-01	2.012E-01	1.774E-01
27500	1.680E-01	1.685E-01	1.691E-01	1.698E-01	1.725E-01	1.776E-01	1.853E-01	1.944E-01	2.032E-01	1.774E-01
28000	1.700E-01	1.705E-01	1.711E-01	1.718E-01	1.745E-01	1.796E-01	1.873E-01	1.964E-01	2.052E-01	1.774E-01
28500	1.720E-01	1.725E-01	1.731E-01	1.738E-01	1.765E-01	1.816E-01	1.893E-01	1.984E-01	2.072E-01	1.774E-01
29000	1.740E-01	1.745E-01	1.751E-01	1.758E-01	1.785E-01	1.836E-01	1.913E-01	2.004E-01	2.092E-01	1.774E-01
29500	1.760E-01	1.765E-01	1.771E-01	1.778E-01	1.805E-01	1.856E-01	1.933E-01	2.024E-01	2.112E-01	1.774E-01
30000	1.780E-01	1.785E-01	1.791E-01	1.798E-01	1.825E-01	1.876E-01	1.953E-01	2.044E-01	2.132E-01	1.774E-01
30500	1.800E-01	1.805E-01	1.811E-01	1.818E-01	1.845E-01	1.896E-01	1.973E-01	2.064E-01	2.152E-01	1.774E-01
31000	1.820E-01	1.825E-01	1.831E-01	1.838E-01	1.865E-01	1.916E-01	1.993E-01	2.084E-01	2.172E-01	1.774E-01
31500	1.840E-01	1.845E-01	1.851E-01	1.858E-01	1.885E-01	1.936E-01	2.013E-01	2.104E-01	2.192E-01	1.774E-01
32000	1.860E-01	1.865E-01	1.871E-01	1.878E-01	1.905E-01	1.956E-01	2.033E-01	2.124E-01	2.212E-01	1.774E-01
32500	1.880E-01	1.885E-01	1.891E-01	1.898E-01	1.925E-01	1.976E-01	2.053E-01	2.144E-01	2.232E-01	1.774E-01
33000	1.900E-01	1.905E-01	1.911E-01	1.918E-01	1.945E-01	1.996E-01	2.073E-01	2.164E-01	2.252E-01	1.774E-01
33500	1.920E-01	1.925E-01	1.931E-01	1.938E-01	1.965E-01	2.016E-01	2.093E-01	2.184E-01	2.272E-01	1.774E-01
34000	1.940E-01	1.945E-01	1.951E-01	1.958E-01	1.985E-01	2.036E-01	2.113E-01	2.204E-01	2.292E-01	1.774E-01
34500	1.960E-01	1.965E-01	1.971E-01	1.978E-01	2.005E-01	2.056E-01	2.133E-01	2.224E-01	2.312E-01	1.774E-01
35000	1.980E-01	1.985E-01	1.991E-01	1.998E-01	2.025E-01	2.076E-01	2.153E-01	2.244E-01	2.332E-01	1.774E-01
35500	2.000E-01	2.005E-01	2.011E-01	2.018E-01	2.045E-01	2.096E-01	2.173E-01	2.264E-01	2.352E-01	1.774E-01
36000	2.020E-01	2.025E-01	2.031E-01	2.038E-01	2.065E-01	2.116E-01	2.193E-01	2.284E-01	2.372E-01	1.774E-01
36500	2.040E-01	2.045E-01	2.051E-01	2.058E-01	2.085E-01	2.136E-01	2.213E-01	2.304E-01	2.392E-01	1.774E-01
37000	2.060E-01	2.065E-01	2.071E-01	2.078E-01	2.105E-01	2.156E-01	2.233E-01	2.324E-01	2.412E-01	1.774E-01
37500	2.080E-01	2.085E-01	2.091E-01	2.098E-01	2.125E-01	2.176E-01	2.253E-01	2.344E-01	2.432E-01	1.774E-01
38000	2.100E-01	2.105E-01	2.111E-01	2.118E-01	2.145E-01	2.196E-01	2.273E-01	2.364E-01	2.452E-01	1.774E-01
38500	2.120E-01	2.125E-01	2.131E-01	2.138E-01	2.165E-01	2.216E-01	2.293E-01	2.384E-01	2.472E-01	1.774E-01
39000	2.140E-01	2.145E-01	2.151E-01	2.158E-01	2.185E-01	2.236E-01	2.313E-01	2.404E-01	2.492E-01	1.774E-01
39500	2.160E-01	2.165E-01	2.171E-01	2.178E-01	2.205E-01	2.256E-01	2.333E-01	2.424E-01	2.512E-01	1.774E-01
40000	2.180E-01	2.185E-01	2.191E-01	2.198E-01	2.225E-01	2.276E-01	2.353E-01	2.444E-01	2.532E-01	1.774E-01
40500	2.200E-01	2.205E-01	2.211E-01	2.218E-01	2.245E-01	2.296E-01	2.373E-01	2.464E-01	2.552E-01	1.774E-01
41000	2.220E-01	2.225E-01	2.231E-01	2.238E-01	2.265E-01	2.316E-01	2.393E-01	2.484E-01	2.572E-01	1.774E-01
41500	2.240E-01	2.245E-01	2.251E-01	2.258E-01	2.285E-01	2.336E-01	2.413E-01	2.504E-01	2.592E-01	1.774E-01
42000	2.260E-01	2.265E-01	2.271E-01	2.278E-01	2.305E-01	2.356E-01	2.433E-01	2.524E-01	2.612E-01	1.774E-01
42500	2.280E-01	2.285E-01	2.291E-01	2.298E-01	2.325E-01	2.376E-01	2.453E-01	2.544E-01	2.632E-01	1.774E-01
43000	2.300E-01	2.305E-01	2.311E-01	2.318E-01	2.345E-01	2.396E-01	2.473E-01	2.564E-01	2.652E-01	1.774E-01
43500	2.320E-01	2.325E-01	2.331E-01	2.338E-01	2.365E-01	2.416E-01	2.493E-01	2.584E-01	2.672E-01	1.774E-01
44000	2.340E-01	2.345E-01	2.351E-01	2.358E-01	2.385E-01	2.436E-01	2.513E-01	2.604E-01	2.692E-01	1.774E-01
44500	2.360E-01	2.365E-01	2.371E-01	2.378E-01	2.405E-01	2.456E-01	2.533E-01	2.624E-01	2.712E-01	1.774E-01
45000	2.380E-01	2.385E-01	2.391E-01	2.398E-01	2.425E-01	2.476E-01	2.553E-01	2.644E-01	2.732E-01	1.774E-01
45500	2.400E-01	2.405E-01	2.411E-01	2.418E-01	2.445E-01	2.496E-01	2.573E-01	2.664E-01	2.752E-01	1.774E-01
46000	2.420E-01	2.425E-01	2.431E-01	2.438E-01	2.465E-01	2.516E-01	2.593E-01	2.684E-01	2.772E-01	1.774E-01
46500	2.440E-01	2.445E-01	2.451E-01	2.458E-01	2.485E-01	2.536E-01	2.613E-01	2.704E-01	2.792E-01	1.774E-01
47000	2.460E-01	2.465E-01	2.471E-01	2.478E-01	2.505E-01	2.556E-01	2.633E-01	2.724E-01	2.812E-01	1.774E-01
47500	2.480E-01	2.485E-01	2.491E-01	2.498E-01	2.525E-01	2.576E-01	2.653E-01	2.744E-01	2.832E-01	1.774E-01
48000	2.500E-01	2.505E-01	2.511E-01	2.518E-01	2.545E-01	2.596E-01	2.673E-01	2.764E-01	2.852E-01	1.774E-01
48500	2.520E-01	2.525E-01	2.531E-01	2.538E-01	2.565E-01	2.616E-01	2.693E-01	2.784E-01	2.872E-01	1.774E-01
49000	2.540E-01	2.545E-01	2.551E-01	2.558E-01	2.585E-01	2.636E-01	2.713E-01			

9CC00	1.434E-01	1.509E-01	1.588E-01	1.649E-01	1.764E-01	1.864E-01	1.955E-01	2.037E-01	2.101E-01	2.114E-01
10C000	1.482E-01	1.534E-01	1.610E-01	1.693E-01	1.779E-01	1.874E-01	1.972E-01	2.058E-01	2.121E-01	2.136E-01
1500C0	1.679E-01	1.805E-01	1.901E-01	1.928E-01	1.947E-01	2.023E-01	2.099E-01	2.182E-01	2.252E-01	2.279E-01
200C00	2.247E-01	2.284E-01	2.284E-01	2.287E-01	2.293E-01	2.311E-01	2.344E-01	2.391E-01	2.440E-01	2.485E-01
300000	2.901E-01	2.917E-01	2.924E-01	2.926E-01	2.924E-01	2.925E-01	2.927E-01	2.934E-01	2.959E-01	2.993E-01
4CC000	2.358E-01	2.635E-01	2.969E-01	3.214E-01	3.332E-01	3.380E-01	3.401E-01	3.415E-01	3.433E-01	3.465E-01
5C0C00	2.004E-01	2.214E-01	2.434E-01	2.635E-01	2.950E-01	3.298E-01	3.562E-01	3.783E-01	3.775E-01	3.829E-01
60C000	1.991E-01	2.057E-01	2.170E-01	2.346E-01	2.615E-01	2.875E-01	3.184E-01	3.539E-01	3.830E-01	4.012E-01
8CC000	2.295E-01	2.302E-01	2.321E-01	2.343E-01	2.435E-01	2.550E-01	2.743E-01	3.014E-01	3.325E-01	3.673E-01
1CC0000	2.639E-01	2.639E-01	2.640E-01	2.644E-01	2.657E-01	2.691E-01	2.760E-01	2.881E-01	3.076E-01	3.352E-01
15C0C00	3.304E-01	3.304E-01	3.304E-01	3.304E-01	3.305E-01	3.304E-01	3.309E-01	3.319E-01	3.347E-01	3.413E-01
2CC0C00	3.761E-01	3.761E-01	3.761E-01	3.761E-01	3.762E-01	3.762E-01	3.764E-01	3.787E-01	3.795E-01	3.813E-01
3000000	4.388E-01	4.393E-01	4.400E-01	4.407E-01	4.414E-01	4.418E-01	4.421E-01	4.425E-01	4.431E-01	4.441E-01
4C00C00	4.794E-01	4.794E-01	4.795E-01	4.796E-01	4.798E-01	4.804E-01	4.812E-01	4.822E-01	4.832E-01	4.844E-01
5C00C00	5.079E-01	5.079E-01	5.080E-01	5.080E-01	5.081E-01	5.082E-01	5.084E-01	5.090E-01	5.100E-01	5.114E-01
6C0C000	5.289E-01	5.289E-01	5.290E-01	5.290E-01	5.290E-01	5.291E-01	5.292E-01	5.295E-01	5.301E-01	5.311E-01
8CC0C00	5.577E-01	5.577E-01	5.577E-01	5.578E-01	5.578E-01	5.579E-01	5.580E-01	5.581E-01	5.585E-01	5.590E-01
1CC0C000	5.766E-01	5.766E-01	5.766E-01	5.766E-01	5.766E-01	5.767E-01	5.768E-01	5.769E-01	5.772E-01	5.776E-01

TABLE 110.

294

9CC00	3.930E 02	3.795E 02	3.612E 02	3.509E 02	3.344E 02	3.214E 02	3.041E 02	2.897E 02	2.739E 02	2.569E 02	2.393E 02
100000	3.957E 02	3.815E 02	3.672E 02	3.529E 02	3.364E 02	3.243E 02	3.097E 02	2.940E 02	2.790E 02	2.627E 02	2.462E 02
150000	4.033E 02	3.890E 02	3.747E 02	3.605E 02	3.442E 02	3.319E 02	3.177E 02	3.034E 02	2.891E 02	2.740E 02	2.605E 02
200000	4.111E 02	3.954E 02	3.806E 02	3.661E 02	3.518E 02	3.394E 02	3.231E 02	3.088E 02	2.945E 02	2.802E 02	2.659E 02
300000	5.133E 02	4.843E 02	4.531E 02	4.232E 02	4.034E 02	3.817E 02	3.592E 02	3.345E 02	3.100E 02	2.913E 02	2.740E 02
400000	5.423E 02	5.222E 02	5.009E 02	4.789E 02	4.579E 02	4.344E 02	4.134E 02	3.871E 02	3.595E 02	3.323E 02	3.097E 02

500000	5.485E 02	5.290E 02	5.104E 02	4.917E 02	4.726E 02	4.531E 02	4.340E 02	4.117E 02	3.901E 02	3.685E 02	3.454E 02
600000	5.530E 02	5.341E 02	5.152E 02	4.963E 02	4.773E 02	4.584E 02	4.394E 02	4.204E 02	4.011E 02	3.812E 02	3.604E 02
800000	5.601E 02	5.412E 02	5.223E 02	5.033E 02	4.844E 02	4.655E 02	4.466E 02	4.277E 02	4.087E 02	3.898E 02	3.709E 02
1000000	5.656E 02	5.467E 02	5.278E 02	5.088E 02	4.899E 02	4.710E 02	4.521E 02	4.332E 02	4.143E 02	3.953E 02	3.764E 02
1500000	5.757E 02	5.567E 02	5.378E 02	5.188E 02	4.999E 02	4.810E 02	4.621E 02	4.432E 02	4.242E 02	4.053E 02	3.864E 02
2000000	5.833E 02	5.643E 02	5.454E 02	5.264E 02	5.074E 02	4.884E 02	4.694E 02	4.504E 02	4.314E 02	4.124E 02	3.934E 02
3000000	5.933E 02	5.744E 02	5.554E 02	5.365E 02	5.175E 02	4.986E 02	4.797E 02	4.607E 02	4.418E 02	4.228E 02	4.039E 02
4000000	6.004E 02	5.815E 02	5.625E 02	5.436E 02	5.246E 02	5.057E 02	4.868E 02	4.679E 02	4.490E 02	4.299E 02	4.110E 02
5000000	6.099E 02	5.870E 02	5.680E 02	5.491E 02	5.301E 02	5.112E 02	4.923E 02	4.733E 02	4.544E 02	4.354E 02	4.165E 02
6000000	6.164E 02	5.915E 02	5.725E 02	5.534E 02	5.344E 02	5.154E 02	4.964E 02	4.774E 02	4.584E 02	4.394E 02	4.210E 02
8000000	6.175E 02	5.906E 02	5.704E 02	5.507E 02	5.317E 02	5.228E 02	5.038E 02	4.848E 02	4.658E 02	4.470E 02	4.281E 02
10000000	6.230E 02	6.041E 02	5.851E 02	5.662E 02	5.472E 02	5.283E 02	5.094E 02	4.904E 02	4.715E 02	4.525E 02	4.336E 02

TABLE 110(CONT) DIMENSIONLESS ENTROPY, S/R, OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
1000	7.001E 01	6.531E 01	6.157E 01	5.842E 01	5.554E 01	5.288E 01	4.951E 01	4.587E 01	4.200E 01	3.804E 01
1050	7.264E 01	6.703E 01	6.271E 01	5.920E 01	5.615E 01	5.328E 01	5.030E 01	4.692E 01	4.320E 01	3.942E 01
1100	7.563E 01	6.910E 01	6.407E 01	6.011E 01	5.681E 01	5.305E 01	5.004E 01	4.777E 01	4.420E 01	4.037E 01
1150	7.898E 01	7.147E 01	6.566E 01	6.117E 01	5.754E 01	5.442E 01	5.150E 01	4.847E 01	4.500E 01	4.147E 01
1200	8.234E 01	7.407E 01	6.747E 01	6.238E 01	5.837E 01	5.502E 01	5.202E 01	4.905E 01	4.583E 01	4.231E 01
1250	8.553E 01	7.680E 01	6.947E 01	6.375E 01	5.929E 01	5.568E 01	5.254E 01	4.957E 01	4.647E 01	4.304E 01
1300	8.834E 01	7.951E 01	7.161E 01	6.524E 01	6.033E 01	5.639E 01	5.308E 01	5.004E 01	4.703E 01	4.373E 01
1350	9.067E 01	8.208E 01	7.381E 01	6.689E 01	6.144E 01	5.717E 01	5.365E 01	5.034E 01	4.752E 01	4.433E 01
1400	9.250E 01	8.439E 01	7.599E 01	6.860E 01	6.268E 01	5.802E 01	5.426E 01	5.102E 01	4.799E 01	4.487E 01
1450	9.388E 01	8.637E 01	7.808E 01	7.036E 01	6.397E 01	5.893E 01	5.490E 01	5.131E 01	4.843E 01	4.535E 01
1500	9.492E 01	8.800E 01	8.001E 01	7.210E 01	6.532E 01	5.990E 01	5.559E 01	5.202E 01	4.880E 01	4.580E 01
1550	9.569E 01	8.930E 01	8.173E 01	7.360E 01	6.670E 01	6.091E 01	5.631E 01	5.254E 01	4.930E 01	4.622E 01
1600	9.628E 01	9.033E 01	8.321E 01	7.541E 01	6.800E 01	6.196E 01	5.707E 01	5.312E 01	4.974E 01	4.663E 01
1650	9.676E 01	9.114E 01	8.447E 01	7.689E 01	6.945E 01	6.304E 01	5.787E 01	5.370E 01	5.019E 01	4.703E 01
1700	9.715E 01	9.178E 01	8.551E 01	7.823E 01	7.077E 01	6.412E 01	5.868E 01	5.430E 01	5.066E 01	4.743E 01
1750	9.749E 01	9.230E 01	8.636E 01	7.942E 01	7.202E 01	6.520E 01	5.951E 01	5.492E 01	5.113E 01	4.783E 01
1800	9.780E 01	9.273E 01	8.707E 01	8.045E 01	7.319E 01	6.627E 01	6.036E 01	5.555E 01	5.142E 01	4.823E 01
1850	9.810E 01	9.310E 01	8.765E 01	8.134E 01	7.428E 01	6.730E 01	6.120E 01	5.620E 01	5.211E 01	4.883E 01
1900	9.842E 01	9.344E 01	8.814E 01	8.211E 01	7.524E 01	6.829E 01	6.204E 01	5.686E 01	5.262E 01	4.905E 01
1950	9.875E 01	9.375E 01	8.857E 01	8.276E 01	7.614E 01	6.923E 01	6.287E 01	5.752E 01	5.313E 01	4.948E 01
2000	9.914E 01	9.405E 01	8.894E 01	8.332E 01	7.693E 01	7.011E 01	6.368E 01	5.817E 01	5.365E 01	4.991E 01
2200	1.017E 02	9.553E 01	9.021E 01	8.487E 01	7.930E 01	7.303E 01	6.641E 01	6.072E 01	5.571E 01	5.167E 01
2400	1.067E 02	9.818E 01	9.173E 01	8.634E 01	8.085E 01	7.508E 01	6.896E 01	6.298E 01	5.771E 01	5.339E 01
2600	1.136E 02	1.027E 02	9.421E 01	8.771E 01	8.210E 01	7.657E 01	7.077E 01	6.499E 01	5.951E 01	5.498E 01
2800	1.204E 02	1.085E 02	9.801E 01	8.987E 01	8.348E 01	7.781E 01	7.218E 01	6.646E 01	6.107E 01	5.640E 01
3000	1.255E 02	1.141E 02	1.027E 02	9.292E 01	8.529E 01	7.909E 01	7.340E 01	6.778E 01	6.237E 01	5.765E 01
3200	1.289E 02	1.187E 02	1.074E 02	9.664E 01	8.767E 01	8.059E 01	7.459E 01	6.894E 01	6.357E 01	5.875E 01
3400	1.313E 02	1.220E 02	1.116E 02	1.005E 02	9.055E 01	8.245E 01	7.588E 01	7.003E 01	6.462E 01	5.974E 01
3600	1.334E 02	1.244E 02	1.148E 02	1.042E 02	9.367E 01	8.465E 01	7.735E 01	7.119E 01	6.563E 01	6.066E 01
3800	1.361E 02	1.265E 02	1.172E 02	1.072E 02	9.674E 01	8.707E 01	7.903E 01	7.241E 01	6.662E 01	6.153E 01
4000	1.397E 02	1.287E 02	1.193E 02	1.097E 02	9.953E 01	8.956E 01	8.089E 01	7.374E 01	6.765E 01	6.239E 01
4200	1.442E 02	1.315E 02	1.212E 02	1.118E 02	1.019E 02	9.196E 01	8.284E 01	7.517E 01	6.873E 01	6.326E 01
4400	1.491E 02	1.350E 02	1.234E 02	1.136E 02	1.040E 02	9.417E 01	8.479E 01	7.688E 01	6.985E 01	6.414E 01
4600	1.537E 02	1.389E 02	1.261E 02	1.155E 02	1.058E 02	9.616E 01	8.688E 01	7.822E 01	7.102E 01	6.504E 01
4800	1.578E 02	1.430E 02	1.291E 02	1.175E 02	1.075E 02	9.794E 01	8.846E 01	7.975E 01	7.222E 01	6.594E 01
5000	1.611E 02	1.468E 02	1.324E 02	1.198E 02	1.092E 02	9.956E 01	9.011E 01	8.124E 01	7.343E 01	6.690E 01
6000	1.755E 02	1.604E 02	1.468E 02	1.330E 02	1.174E 02	9.710E 01	8.774E 01	7.912E 01	7.153E 01	6.912E 01
7000	1.931E 02	1.751E 02	1.582E 02	1.433E 02	1.296E 02	1.163E 02	1.041E 02	9.348E 01	8.412E 01	7.581E 01
8000	2.065E 02	1.884E 02	1.708E 02	1.536E 02	1.381E 02	1.241E 02	1.112E 02	9.932E 01	8.893E 01	7.989E 01

100000	2.291E 02	2.104E 02	1.908E 02	1.722E 02	1.537E 02	1.352E 02	1.167E 02	0.982E 01	0.797E 01
120000	2.389E 02	2.225E 02	2.054E 02	1.872E 02	1.685E 02	1.500E 02	1.315E 02	1.130E 02	0.945E 01
140000	2.486E 02	2.312E 02	2.137E 02	1.955E 02	1.767E 02	1.582E 02	1.397E 02	1.212E 02	1.027E 02
160000	2.584E 02	2.373E 02	2.229E 02	2.033E 02	1.833E 02	1.633E 02	1.433E 02	1.233E 02	1.033E 02
180000	2.682E 02	2.415E 02	2.272E 02	2.120E 02	1.903E 02	1.685E 02	1.467E 02	1.250E 02	1.033E 02
200000	2.779E 02	2.451E 02	2.307E 02	2.163E 02	1.933E 02	1.703E 02	1.473E 02	1.250E 02	1.033E 02
220000	2.876E 02	2.504E 02	2.345E 02	2.196E 02	1.955E 02	1.723E 02	1.493E 02	1.267E 02	1.043E 02
240000	2.973E 02	2.547E 02	2.429E 02	2.245E 02	2.004E 02	1.773E 02	1.533E 02	1.317E 02	1.083E 02
260000	3.070E 02	2.793E 02	2.571E 02	2.340E 02	2.145E 02	1.873E 02	1.633E 02	1.417E 02	1.183E 02
280000	3.167E 02	2.929E 02	2.687E 02	2.435E 02	2.245E 02	1.973E 02	1.733E 02	1.517E 02	1.283E 02
300000	3.264E 02	3.168E 02	2.931E 02	2.676E 02	2.470E 02	2.203E 02	1.953E 02	1.733E 02	1.483E 02
320000	3.361E 02	3.273E 02	3.059E 02	2.839E 02	2.604E 02	2.303E 02	2.053E 02	1.833E 02	1.583E 02
340000	3.458E 02	3.326E 02	3.129E 02	2.924E 02	2.708E 02	2.403E 02	2.153E 02	1.933E 02	1.683E 02
360000	3.555E 02	3.359E 02	3.160E 02	2.973E 02	2.772E 02	2.460E 02	2.210E 02	1.993E 02	1.743E 02
380000	3.652E 02	3.385E 02	3.194E 02	3.005E 02	2.811E 02	2.511E 02	2.261E 02	2.043E 02	1.843E 02
400000	3.749E 02	3.431E 02	3.241E 02	3.052E 02	2.862E 02	2.573E 02	2.323E 02	2.103E 02	1.943E 02
420000	3.846E 02	3.466E 02	3.294E 02	3.107E 02	2.918E 02	2.628E 02	2.378E 02	2.158E 02	1.998E 02
440000	3.943E 02	3.557E 02	3.367E 02	3.178E 02	2.989E 02	2.749E 02	2.459E 02	2.239E 02	2.078E 02
460000	4.040E 02	3.612E 02	3.423E 02	3.233E 02	3.044E 02	2.855E 02	2.515E 02	2.295E 02	2.134E 02
480000	4.137E 02	3.659E 02	3.469E 02	3.279E 02	3.090E 02	2.900E 02	2.570E 02	2.350E 02	2.190E 02
500000	4.234E 02	3.698E 02	3.509E 02	3.319E 02	3.129E 02	2.939E 02	2.649E 02	2.409E 02	2.239E 02
520000	4.331E 02	3.731E 02	3.542E 02	3.352E 02	3.163E 02	2.973E 02	2.703E 02	2.463E 02	2.293E 02
540000	4.428E 02	3.760E 02	3.571E 02	3.381E 02	3.192E 02	3.002E 02	2.813E 02	2.523E 02	2.343E 02
560000	4.525E 02	3.786E 02	3.597E 02	3.407E 02	3.218E 02	3.028E 02	2.839E 02	2.549E 02	2.369E 02
580000	4.622E 02	3.831E 02	3.642E 02	3.452E 02	3.263E 02	3.074E 02	2.884E 02	2.594E 02	2.414E 02
600000	4.719E 02	3.869E 02	3.680E 02	3.490E 02	3.301E 02	3.112E 02	2.922E 02	2.632E 02	2.452E 02
620000	4.816E 02	3.902E 02	3.713E 02	3.523E 02	3.334E 02	3.145E 02	2.955E 02	2.665E 02	2.485E 02
640000	4.913E 02	3.931E 02	3.747E 02	3.552E 02	3.363E 02	3.174E 02	2.984E 02	2.694E 02	2.514E 02
660000	5.010E 02	3.951E 02	3.776E 02	3.578E 02	3.389E 02	3.200E 02	3.010E 02	2.721E 02	2.542E 02

TABLE 111. ENTROPY (ERG/CM-DEG K) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-9.0	-8.5	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0
1000	4.141E 08	4.009E 08	3.877E 08	3.743E 08	3.603E 08	3.448E 08	3.284E 08	3.000E 08	2.703E 08	2.419E 08	2.187E 08
1050	4.152E 08	4.019E 08	3.887E 08	3.753E 08	3.620E 08	3.478E 08	3.317E 08	3.113E 08	2.851E 08	2.561E 08	2.294E 08
1100	4.163E 08	4.029E 08	3.897E 08	3.763E 08	3.632E 08	3.495E 08	3.350E 08	3.100E 08	2.942E 08	2.692E 08	2.414E 08
1150	4.180E 08	4.041E 08	3.907E 08	3.774E 08	3.642E 08	3.508E 08	3.369E 08	3.210E 08	3.035E 08	2.800E 08	2.528E 08
1200	4.215E 08	4.086E 08	3.910E 08	3.784E 08	3.651E 08	3.518E 08	3.383E 08	3.241E 08	3.000E 08	2.879E 08	2.630E 08
1250	4.259E 08	4.092E 08	3.935E 08	3.795E 08	3.660E 08	3.527E 08	3.392E 08	3.256E 08	3.108E 08	2.933E 08	2.712E 08
1300	4.444E 08	4.162E 08	3.965E 08	3.810E 08	3.671E 08	3.536E 08	3.403E 08	3.268E 08	3.120E 08	2.968E 08	2.774E 08
1350	4.673E 08	4.291E 08	4.025E 08	3.834E 08	3.684E 08	3.548E 08	3.412E 08	3.277E 08	3.140E 08	2.992E 08	2.818E 08
1400	4.931E 08	4.488E 08	4.131E 08	3.888E 08	3.706E 08	3.558E 08	3.421E 08	3.286E 08	3.151E 08	3.009E 08	2.849E 08
1450	5.159E 08	4.714E 08	4.291E 08	3.967E 08	3.743E 08	3.574E 08	3.431E 08	3.295E 08	3.160E 08	3.022E 08	2.872E 08
1500	5.336E 08	4.930E 08	4.488E 08	4.094E 08	3.806E 08	3.604E 08	3.444E 08	3.305E 08	3.169E 08	3.032E 08	2.880E 08
1550	5.475E 08	5.107E 08	4.687E 08	4.258E 08	3.902E 08	3.649E 08	3.466E 08	3.316E 08	3.178E 08	3.041E 08	2.901E 08
1600	5.584E 08	5.247E 08	4.843E 08	4.434E 08	4.031E 08	3.718E 08	3.498E 08	3.332E 08	3.187E 08	3.050E 08	2.911E 08
1650	5.660E 08	5.359E 08	5.007E 08	4.608E 08	4.183E 08	3.815E 08	3.544E 08	3.353E 08	3.199E 08	3.059E 08	2.921E 08
1700	5.708E 08	5.443E 08	5.123E 08	4.732E 08	4.339E 08	3.935E 08	3.614E 08	3.385E 08	3.219E 08	3.040E 08	2.930E 08
1750	5.738E 08	5.499E 08	5.214E 08	4.874E 08	4.484E 08	4.070E 08	3.703E 08	3.431E 08	3.256E 08	3.080E 08	2.930E 08
1800	5.774E 08	5.530E 08	5.227E 08	4.905E 08	4.510E 08	4.205E 08	3.810E 08	3.493E 08	3.285E 08	3.094E 08	2.940E 08
1850	5.774E 08	5.530E 08	5.227E 08	4.905E 08	4.510E 08	4.205E 08	3.810E 08	3.493E 08	3.285E 08	3.094E 08	2.940E 08
1900	5.790E 08	5.548E 08	5.350E 08	5.107E 08	4.803E 08	4.443E 08	4.044E 08	3.662E 08	3.358E 08	3.139E 08	2.971E 08
1950	5.808E 08	5.564E 08	5.380E 08	5.147E 08	4.872E 08	4.539E 08	4.154E 08	3.761E 08	3.422E 08	3.172E 08	2.987E 08
2000	5.834E 08	5.610E 08	5.397E 08	5.173E 08	4.923E 08	4.618E 08	4.237E 08	3.863E 08	3.498E 08	3.214E 08	3.008E 08
2200	6.141E 08	5.716E 08	5.476E 08	5.245E 08	5.027E 08	4.797E 08	4.531E 08	4.208E 08	3.837E 08	3.465E 08	3.151E 08
2400	6.768E 08	6.228E 08	5.738E 08	5.371E 08	5.100E 08	4.849E 08	4.644E 08	4.394E 08	4.098E 08	3.748E 08	3.363E 08
2600	7.183E 08	6.745E 08	6.240E 08	5.720E 08	5.283E 08	4.962E 08	4.710E 08	4.481E 08	4.238E 08	3.953E 08	3.616E 08
2800	7.334E 08	7.025E 08	6.631E 08	6.164E 08	5.653E 08	5.183E 08	4.822E 08	4.549E 08	4.312E 08	4.040E 08	3.766E 08
3000	7.444E 08	7.142E 08	6.828E 08	6.463E 08	6.025E 08	5.529E 08	5.051E 08	4.670E 08	4.382E 08	4.137E 08	3.880E 08
3200	7.633E 08	7.244E 08	6.925E 08	6.617E 08	6.261E 08	5.839E 08	5.359E 08	4.886E 08	4.500E 08	4.206E 08	3.954E 08
3400	8.049E 08	7.486E 08	7.047E 08	6.704E 08	6.384E 08	6.038E 08	5.625E 08	5.153E 08	4.691E 08	4.313E 08	4.022E 08
3600	8.557E 08	7.919E 08	7.315E 08	6.841E 08	6.478E 08	6.152E 08	5.801E 08	5.387E 08	4.921E 08	4.475E 08	4.113E 08
3800	8.872E 08	8.331E 08	7.714E 08	7.103E 08	6.620E 08	6.244E 08	5.909E 08	5.550E 08	5.130E 08	4.670E 08	4.245E 08
4000	9.054E 08	8.594E 08	8.066E 08	7.464E 08	6.938E 08	6.380E 08	6.000E 08	5.658E 08	5.286E 08	4.857E 08	4.407E 08
4200	9.237E 08	8.761E 08	8.299E 08	7.774E 08	7.181E 08	6.599E 08	6.123E 08	5.746E 08	5.396E 08	5.008E 08	4.572E 08
4400	9.530E 08	8.941E 08	8.457E 08	7.987E 08	7.459E 08	6.871E 08	6.309E 08	5.854E 08	5.483E 08	5.121E 08	4.716E 08
4600	9.894E 08	9.211E 08	8.626E 08	8.140E 08	7.661E 08	7.174E 08	6.543E 08	6.007E 08	5.576E 08	5.209E 08	4.832E 08
4800	1.020E 09	9.535E 08	8.865E 08	8.295E 08	7.810E 08	7.320E 08	6.772E 08	6.201E 08	5.699E 08	5.292E 08	4.924E 08
5000	1.042E 09	9.817E 08	9.153E 08	8.501E 08	7.951E 08	7.467E 08	6.963E 08	6.406E 08	5.856E 08	5.390E 08	5.003E 08
6000	1.083E 09	1.038E 09	9.938E 08	9.288E 08	8.919E 08	8.307E 08	7.693E 08	7.093E 08	6.506E 08	6.077E 08	5.542E 08
7000	1.115E 09	1.070E 09	1.023E 09	9.745E 08	9.283E 08	8.828E 08	8.339E 08	7.781E 08	7.170E 08	6.577E 08	6.049E 08
8000	1.124E 09	1.083E 09	1.041E 09	9.984E 08	9.533E 08	9.057E 08	8.585E 08	8.123E 08	7.637E 08	7.090E 08	6.496E 08

100000	1.120E 09	1.072E 09	1.072E 09	1.013E 09	9.719E 08	9.307E 08	8.890E 08	8.461E 08	8.009E 08	7.539E 08	7.067E 08
120000	1.146E 09	1.103E 09	1.064E 09	1.023E 09	9.810E 08	9.408E 08	8.998E 08	8.587E 08	8.174E 08	7.753E 08	7.314E 08
150000	1.158E 09	1.117E 09	1.074E 09	1.035E 09	9.937E 08	9.527E 08	9.118E 08	8.708E 08	8.298E 08	7.888E 08	7.476E 08
200000	1.180E 09	1.135E 09	1.092E 09	1.051E 09	1.010E 09	9.684E 08	9.273E 08	8.862E 08	8.452E 08	8.042E 08	7.632E 08
250000	1.324E 09	1.264E 09	1.201E 09	1.125E 09	1.052E 09	9.926E 08	9.439E 08	8.901E 08	8.361E 08	7.824E 08	7.294E 08
300000	1.473E 09	1.390E 09	1.301E 09	1.220E 09	1.155E 09	1.095E 09	1.031E 09	9.608E 08	8.921E 08	8.340E 08	7.808E 08
350000	1.523E 09	1.462E 09	1.403E 09	1.339E 09	1.265E 09	1.181E 09	1.099E 09	1.029E 09	9.674E 08	9.033E 08	8.349E 08
400000	1.557E 09	1.499E 09	1.438E 09	1.375E 09	1.313E 09	1.253E 09	1.187E 09	1.111E 09	1.029E 09	9.530E 08	8.888E 08
450000	1.567E 09	1.512E 09	1.457E 09	1.401E 09	1.343E 09	1.281E 09	1.219E 09	1.158E 09	1.093E 09	1.020E 09	9.405E 08
500000	1.574E 09	1.520E 09	1.464E 09	1.411E 09	1.354E 09	1.301E 09	1.243E 09	1.182E 09	1.120E 09	1.058E 09	9.915E 08
600000	1.587E 09	1.533E 09	1.479E 09	1.424E 09	1.370E 09	1.316E 09	1.261E 09	1.207E 09	1.151E 09	1.094E 09	1.034E 09
700000	1.598E 09	1.544E 09	1.490E 09	1.435E 09	1.381E 09	1.327E 09	1.272E 09	1.218E 09	1.164E 09	1.109E 09	1.054E 09
800000	1.608E 09	1.553E 09	1.499E 09	1.445E 09	1.390E 09	1.334E 09	1.282E 09	1.228E 09	1.173E 09	1.119E 09	1.064E 09
900000	1.616E 09	1.562E 09	1.507E 09	1.453E 09	1.399E 09	1.344E 09	1.290E 09	1.236E 09	1.182E 09	1.127E 09	1.073E 09
1000000	1.623E 09	1.569E 09	1.515E 09	1.461E 09	1.406E 09	1.352E 09	1.298E 09	1.243E 09	1.189E 09	1.135E 09	1.080E 09
1200000	1.636E 09	1.582E 09	1.528E 09	1.473E 09	1.419E 09	1.365E 09	1.311E 09	1.256E 09	1.202E 09	1.148E 09	1.093E 09
1500000	1.652E 09	1.598E 09	1.544E 09	1.489E 09	1.435E 09	1.381E 09	1.326E 09	1.272E 09	1.218E 09	1.163E 09	1.109E 09
2000000	1.674E 09	1.620E 09	1.565E 09	1.511E 09	1.456E 09	1.402E 09	1.347E 09	1.293E 09	1.238E 09	1.184E 09	1.129E 09
2500000	1.690E 09	1.636E 09	1.581E 09	1.527E 09	1.473E 09	1.418E 09	1.364E 09	1.309E 09	1.255E 09	1.200E 09	1.146E 09
3000000	1.703E 09	1.649E 09	1.594E 09	1.540E 09	1.485E 09	1.431E 09	1.377E 09	1.322E 09	1.268E 09	1.214E 09	1.159E 09
3500000	1.714E 09	1.659E 09	1.605E 09	1.551E 09	1.496E 09	1.442E 09	1.388E 09	1.333E 09	1.279E 09	1.225E 09	1.170E 09
4000000	1.723E 09	1.669E 09	1.615E 09	1.560E 09	1.504E 09	1.451E 09	1.397E 09	1.343E 09	1.289E 09	1.234E 09	1.180E 09
4500000	1.732E 09	1.677E 09	1.623E 09	1.569E 09	1.514E 09	1.460E 09	1.405E 09	1.351E 09	1.297E 09	1.242E 09	1.188E 09
5000000	1.739E 09	1.685E 09	1.630E 09	1.576E 09	1.522E 09	1.467E 09	1.413E 09	1.359E 09	1.304E 09	1.250E 09	1.195E 09
6000000	1.752E 09	1.698E 09	1.643E 09	1.589E 09	1.535E 09	1.480E 09	1.426E 09	1.371E 09	1.317E 09	1.263E 09	1.208E 09
7000000	1.763E 09	1.709E 09	1.654E 09	1.600E 09	1.545E 09	1.491E 09	1.437E 09	1.382E 09	1.328E 09	1.274E 09	1.219E 09
8000000	1.772E 09	1.718E 09	1.664E 09	1.609E 09	1.555E 09	1.501E 09	1.446E 09	1.392E 09	1.337E 09	1.283E 09	1.229E 09
9000000	1.781E 09	1.726E 09	1.672E 09	1.618E 09	1.563E 09	1.509E 09	1.455E 09	1.400E 09	1.346E 09	1.291E 09	1.237E 09
10000000	1.788E 09	1.734E 09	1.679E 09	1.625E 09	1.571E 09	1.516E 09	1.462E 09	1.408E 09	1.353E 09	1.299E 09	1.245E 09

TABLE 111(CONT) ENTROPY (ERG/CM-DEG K) OF EQUILIBRIUM AIR

TEMP. (DEG K)	-3.3	-3.0	-2.5	-2.0	-1.0	-0.5	0.0	0.5	1.0
10000	2.009E 08	1.674E 08	1.767E 08	1.61E 08	1.512E 08	1.421E 08	1.317E 08	1.208E 08	1.110E 08
10500	2.035E 08	1.924E 08	1.800E 08	1.651E 08	1.529E 08	1.444E 08	1.347E 08	1.240E 08	1.137E 08
11000	2.172E 08	1.983E 08	1.839E 08	1.691E 08	1.561E 08	1.462E 08	1.371E 08	1.264E 08	1.164E 08
11500	2.267E 08	2.051E 08	1.885E 08	1.756E 08	1.652E 08	1.578E 08	1.391E 08	1.294E 08	1.190E 08
12000	2.363E 08	2.120E 08	1.917E 08	1.790E 08	1.675E 08	1.593E 08	1.408E 08	1.315E 08	1.214E 08
12500	2.459E 08	2.204E 08	1.994E 08	1.830E 08	1.702E 08	1.598E 08	1.423E 08	1.334E 08	1.236E 08
13000	2.554E 08	2.282E 08	2.059E 08	1.873E 08	1.731E 08	1.574E 08	1.437E 08	1.350E 08	1.255E 08
13500	2.603E 08	2.356E 08	2.119E 08	1.920E 08	1.764E 08	1.540E 08	1.451E 08	1.364E 08	1.272E 08
14000	2.659E 08	2.422E 08	2.181E 08	1.969E 08	1.799E 08	1.557E 08	1.464E 08	1.377E 08	1.288E 08
14500	2.695E 08	2.479E 08	2.241E 08	2.019E 08	1.834E 08	1.576E 08	1.479E 08	1.390E 08	1.302E 08
15000	2.724E 08	2.526E 08	2.294E 08	2.070E 08	1.875E 08	1.596E 08	1.493E 08	1.403E 08	1.315E 08
15500	2.747E 08	2.563E 08	2.344E 08	2.118E 08	1.914E 08	1.616E 08	1.509E 08	1.415E 08	1.327E 08
16000	2.764E 08	2.593E 08	2.388E 08	2.164E 08	1.954E 08	1.638E 08	1.525E 08	1.428E 08	1.339E 08
16500	2.777E 08	2.616E 08	2.424E 08	2.207E 08	1.993E 08	1.661E 08	1.541E 08	1.441E 08	1.350E 08
17000	2.788E 08	2.634E 08	2.454E 08	2.245E 08	2.031E 08	1.684E 08	1.558E 08	1.454E 08	1.361E 08
17500	2.798E 08	2.649E 08	2.479E 08	2.279E 08	2.067E 08	1.708E 08	1.574E 08	1.468E 08	1.373E 08
18000	2.807E 08	2.662E 08	2.499E 08	2.309E 08	2.101E 08	1.732E 08	1.595E 08	1.482E 08	1.384E 08
18500	2.814E 08	2.672E 08	2.516E 08	2.335E 08	2.132E 08	1.757E 08	1.613E 08	1.494E 08	1.396E 08
19000	2.823E 08	2.682E 08	2.530E 08	2.357E 08	2.160E 08	1.781E 08	1.632E 08	1.518E 08	1.408E 08
19500	2.835E 08	2.691E 08	2.542E 08	2.375E 08	2.184E 08	1.805E 08	1.651E 08	1.525E 08	1.420E 08
20000	2.844E 08	2.700E 08	2.553E 08	2.392E 08	2.208E 08	1.828E 08	1.670E 08	1.540E 08	1.433E 08
20500	2.851E 08	2.742E 08	2.589E 08	2.439E 08	2.274E 08	1.912E 08	1.743E 08	1.599E 08	1.483E 08
21000	2.862E 08	2.818E 08	2.633E 08	2.475E 08	2.320E 08	1.979E 08	1.809E 08	1.654E 08	1.532E 08
21500	2.872E 08	2.894E 08	2.704E 08	2.518E 08	2.357E 08	2.031E 08	1.863E 08	1.708E 08	1.578E 08
22000	2.884E 08	2.976E 08	2.813E 08	2.579E 08	2.394E 08	2.072E 08	1.908E 08	1.753E 08	1.619E 08
22500	2.896E 08	3.064E 08	2.948E 08	2.647E 08	2.440E 08	2.107E 08	1.945E 08	1.791E 08	1.655E 08
23000	2.909E 08	3.147E 08	3.084E 08	2.714E 08	2.514E 08	2.141E 08	1.979E 08	1.825E 08	1.684E 08
23500	2.922E 08	3.202E 08	3.202E 08	2.804E 08	2.593E 08	2.178E 08	2.011E 08	1.855E 08	1.715E 08
24000	2.935E 08	3.257E 08	3.294E 08	2.889E 08	2.680E 08	2.220E 08	2.043E 08	1.884E 08	1.741E 08
24500	2.948E 08	3.313E 08	3.345E 08	2.977E 08	2.777E 08	2.268E 08	2.078E 08	1.912E 08	1.764E 08
25000	2.961E 08	3.369E 08	3.423E 08	3.069E 08	2.871E 08	2.322E 08	2.117E 08	1.942E 08	1.791E 08
25500	2.974E 08	3.426E 08	3.479E 08	3.164E 08	2.962E 08	2.378E 08	2.158E 08	1.973E 08	1.816E 08
26000	2.987E 08	3.484E 08	3.543E 08	3.261E 08	3.054E 08	2.434E 08	2.201E 08	2.005E 08	1.841E 08
26500	2.999E 08	3.542E 08	3.618E 08	3.315E 08	3.148E 08	2.488E 08	2.245E 08	2.039E 08	1.867E 08
27000	3.011E 08	3.600E 08	3.705E 08	3.373E 08	3.244E 08	2.539E 08	2.289E 08	2.073E 08	1.893E 08
27500	3.023E 08	3.658E 08	3.800E 08	3.438E 08	3.342E 08	2.584E 08	2.332E 08	2.106E 08	1.920E 08
28000	3.035E 08	3.716E 08	3.905E 08	3.508E 08	3.442E 08	2.634E 08	2.376E 08	2.139E 08	1.947E 08
28500	3.047E 08	3.774E 08	4.013E 08	3.589E 08	3.544E 08	2.689E 08	2.420E 08	2.174E 08	1.974E 08
29000	3.059E 08	3.832E 08	4.126E 08	3.674E 08	3.648E 08	2.740E 08	2.464E 08	2.209E 08	2.001E 08
29500	3.071E 08	3.890E 08	4.240E 08	3.762E 08	3.754E 08	2.791E 08	2.508E 08	2.244E 08	2.028E 08
30000	3.083E 08	3.948E 08	4.354E 08	3.852E 08	3.862E 08	2.842E 08	2.552E 08	2.279E 08	2.055E 08
30500	3.095E 08	4.006E 08	4.468E 08	3.944E 08	3.972E 08	2.893E 08	2.596E 08	2.314E 08	2.082E 08
31000	3.107E 08	4.064E 08	4.582E 08	4.038E 08	4.084E 08	2.944E 08	2.640E 08	2.349E 08	2.109E 08
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32000	3.131E 08	4.180E 08	4.810E 08	4.232E 08	4.314E 08	3.046E 08	2.728E 08	2.419E 08	2.163E 08
32500	3.143E 08	4.238E 08	4.924E 08	4.332E 08	4.432E 08	3.097E 08	2.772E 08	2.454E 08	2.190E 08
33000	3.155E 08	4.296E 08	5.038E 08	4.434E 08	4.552E 08	3.148E 08	2.816E 08	2.489E 08	2.217E 08
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34500	3.191E 08	4.470E 08	5.380E 08	4.752E 08	4.924E 08	3.301E 08	2.933E 08	2.594E 08	2.298E 08
35000	3.203E 08	4.528E 08	5.494E 08	4.862E 08	5.052E 08	3.352E 08	2.972E 08	2.629E 08	2.325E 08
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36000	3.227E 08	4.644E 08	5.722E 08	5.088E 08	5.314E 08	3.454E 08	3.050E 08	2.699E 08	2.379E 08
36500	3.239E 08	4.702E 08	5.836E 08	5.204E 08	5.448E 08	3.505E 08	3.089E 08	2.734E 08	2.406E 08
37000	3.251E 08	4.760E 08	5.950E 08	5.322E 08	5.584E 08	3.556E 08	3.128E 08	2.769E 08	2.433E 08
37500	3.263E 08	4.818E 08	6.064E 08	5.442E 08	5.722E 08	3.607E 08	3.167E 08	2.804E 08	2.460E 08
38000	3.275E 08	4.876E 08	6.178E 08	5.564E 08	5.862E 08	3.658E 08	3.206E 08	2.839E 08	2.487E 08
38500	3.287E 08	4.934E 08	6.292E 08	5.688E 08	6.004E 08	3.709E 08	3.245E 08	2.874E 08	2.514E 08
39000	3.299E 08	4.992E 08	6.406E 08	5.814E 08	6.148E 08	3.760E 08	3.284E 08	2.909E 08	2.541E 08
39500	3.311E 08	5.050E 08	6.520E 08	5.942E 08	6.294E 08	3.811E 08	3.323E 08	2.944E 08	2.568E 08
40000	3.323E 08	5.108E 08	6.634E 08	6.072E 08	6.442E 08	3.862E 08	3.362E 08	2.979E 08	2.595E 08
40500	3.335E 08	5.166E 08	6.748E 08	6.204E 08	6.592E 08	3.913E 08	3.401E 08	3.014E 08	2.622E 08
41000	3.347E 08	5.224E 08	6.862E 08	6.338E 08	6.744E 08	3.964E 08	3.440E 08	3.049E 08	2.649E 08
41500	3.359E 08	5.282E 08	6.976E 08	6.474E 08	6.898E 08	4.015E 08	3.479E 08	3.084E 08	2.676E 08
42000	3.371E 08	5.340E 08	7.090E 08	6.612E 08	7.054E 08	4.066E 08	3.518E 08	3.119E 08	2.703E 08
42500	3.383E 08	5.398E 08	7.204E 08	6.752E 08	7.212E 08	4.117E 08	3.557E 08	3.154E 08	2.730E 08
43000	3.395E 08	5.456E 08	7.318E 08	6.894E 08	7.372E 08	4.168E 08	3.596E 08	3.189E 08	2.757E 08
43500	3.407E 08	5.514E 08	7.432E 08	7.038E 08	7.534E 08	4.219E 08	3.635E 08	3.224E 08	2.784E 08
44000	3.419E 08	5.572E 08	7.546E 08	7.184E 08	7.698E 08	4.270E 08	3.674E 08	3.259E 08	2.811E 08
44500	3.431E 08	5.630E 08	7.660E 08	7.332E 08	7.864E 08	4.321E 08	3.713E 08	3.294E 08	2.838E 08
45000	3.443E 08	5.688E 08	7.774E 08	7.482E 08	8.032E 08	4.372E 08	3.752E 08	3.329E 08	2.865E 08
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46500	3.479E 08	5.862E 08	8.116E 08	7.944E 08	8.548E 08	4.525E 08	3.869E 08	3.434E 08	2.946E 08
47000	3.491E 08	5.920E 08	8.230E 08	8.102E 08	8.724E 08	4.576E 08	3.908E 08	3.469E 08	2.973E 08
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48000	3.515E 08	6.036E 08	8.458E 08	8.424E 08	9.082E 08	4.678E 08	3.986E 08	3.539E 08	3.027E 08
48500	3.527E 08	6.094E 08	8.572E 08	8.588E 08	9.264E 08	4.729E 08	4.025E 08	3.574E 08	3.054E 08
49000	3.539E 08	6.152E 08	8.686E 08	8.754E 08	9.448E 08	4.780E 08	4.064E 08	3.609E 08	3.081E 08
49500	3.551E 08	6.210E 08	8.800E 08	8.922E 08	9.634E 08	4.831E 08	4.103E 08	3.644E 08	3.108E 08
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52500	3.623E 08	6.558E 08	9.484E 08	9.972E 08	10.792E 08	5.137E 08	4.337E 08	3.854E 08	3.270E 08
53000	3.635E 08	6.616E 08	9.598E 08	10.154E 08					

120000	6.837E 08	6.383E 08	5.894E 08	5.373E 08	4.837E 08	4.329E 08	3.857E 08	3.424E 08	3.042E 08	2.711E 08
150000	7.060E 08	6.635E 08	6.191E 08	5.727E 08	5.244E 08	4.743E 08	4.242E 08	3.764E 08	3.335E 08	2.704E 08
200000	7.222E 08	6.811E 08	6.398E 08	5.977E 08	5.549E 08	5.101E 08	4.635E 08	4.162E 08	3.700E 08	3.272E 08
250000	7.343E 08	6.932E 08	6.521E 08	6.109E 08	5.695E 08	5.270E 08	4.834E 08	4.387E 08	3.933E 08	3.491E 08
300000	7.459E 08	7.036E 08	6.622E 08	6.209E 08	5.795E 08	5.379E 08	4.957E 08	4.520E 08	4.085E 08	3.644E 08
350000	7.571E 08	7.158E 08	6.730E 08	6.302E 08	5.863E 08	5.462E 08	5.049E 08	4.624E 08	4.194E 08	3.750E 08
400000	8.237E 08	7.597E 08	6.973E 08	6.443E 08	5.981E 08	5.550E 08	5.128E 08	4.704E 08	4.279E 08	3.849E 08
450000	8.647E 08	8.016E 08	7.380E 08	6.739E 08	6.157E 08	5.658E 08	5.210E 08	4.780E 08	4.353E 08	3.924E 08
500000	9.173E 08	8.406E 08	7.712E 08	7.074E 08	6.441E 08	5.843E 08	5.323E 08	4.841E 08	4.423E 08	3.992E 08
600000	9.724E 08	9.094E 08	8.414E 08	7.681E 08	6.949E 08	6.319E 08	5.690E 08	5.114E 08	4.594E 08	4.129E 08
700000	9.979E 08	9.393E 08	8.781E 08	8.140E 08	7.473E 08	6.763E 08	6.080E 08	5.447E 08	4.852E 08	4.309E 08
800000	1.010E 09	9.547E 08	8.922E 08	8.391E 08	7.774E 08	7.120E 08	6.443E 08	5.761E 08	5.123E 08	4.529E 08
900000	1.019E 09	9.641E 08	9.092E 08	8.534E 08	7.959E 08	7.340E 08	6.712E 08	6.044E 08	5.377E 08	4.747E 08
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1200000	1.039E 09	9.847E 08	9.303E 08	8.759E 08	8.214E 08	7.644E 08	7.104E 08	6.524E 08	5.914E 08	5.285E 08
1500000	1.053E 09	1.000E 09	9.462E 08	8.910E 08	8.374E 08	7.830E 08	7.283E 08	6.731E 08	6.168E 08	5.585E 08
2000000	1.073E 09	1.021E 09	9.663E 08	9.122E 08	8.579E 08	8.035E 08	7.491E 08	6.945E 08	6.397E 08	5.843E 08
2500000	1.091E 09	1.037E 09	9.824E 08	9.280E 08	8.737E 08	8.193E 08	7.650E 08	7.105E 08	6.559E 08	6.011E 08
3000000	1.105E 09	1.050E 09	9.958E 08	9.413E 08	8.868E 08	8.323E 08	7.779E 08	7.235E 08	6.690E 08	6.143E 08
3500000	1.114E 09	1.061E 09	1.007E 09	9.528E 08	8.981E 08	8.435E 08	7.890E 08	7.345E 08	6.800E 08	6.254E 08
4000000	1.123E 09	1.071E 09	1.017E 09	9.622E 08	9.078E 08	8.533E 08	7.989E 08	7.442E 08	6.894E 08	6.350E 08
4500000	1.134E 09	1.079E 09	1.025E 09	9.705E 08	9.162E 08	8.619E 08	8.073E 08	7.528E 08	6.982E 08	6.434E 08
5000000	1.141E 09	1.087E 09	1.032E 09	9.780E 08	9.236E 08	8.693E 08	8.148E 08	7.604E 08	7.058E 08	6.512E 08
6000000	1.154E 09	1.100E 09	1.045E 09	9.909E 08	9.366E 08	8.822E 08	8.278E 08	7.734E 08	7.189E 08	6.644E 08
7000000	1.165E 09	1.111E 09	1.056E 09	1.002E 09	9.475E 08	8.931E 08	8.387E 08	7.843E 08	7.299E 08	6.755E 08
8000000	1.174E 09	1.120E 09	1.064E 09	1.011E 09	9.569E 08	9.026E 08	8.482E 08	7.938E 08	7.394E 08	6.850E 08
9000000	1.183E 09	1.128E 09	1.074E 09	1.020E 09	9.653E 08	9.109E 08	8.565E 08	8.022E 08	7.478E 08	6.938E 08
10000000	1.190E 09	1.134E 09	1.081E 09	1.027E 09	9.728E 08	9.184E 08	8.640E 08	8.094E 08	7.552E 08	7.008E 08

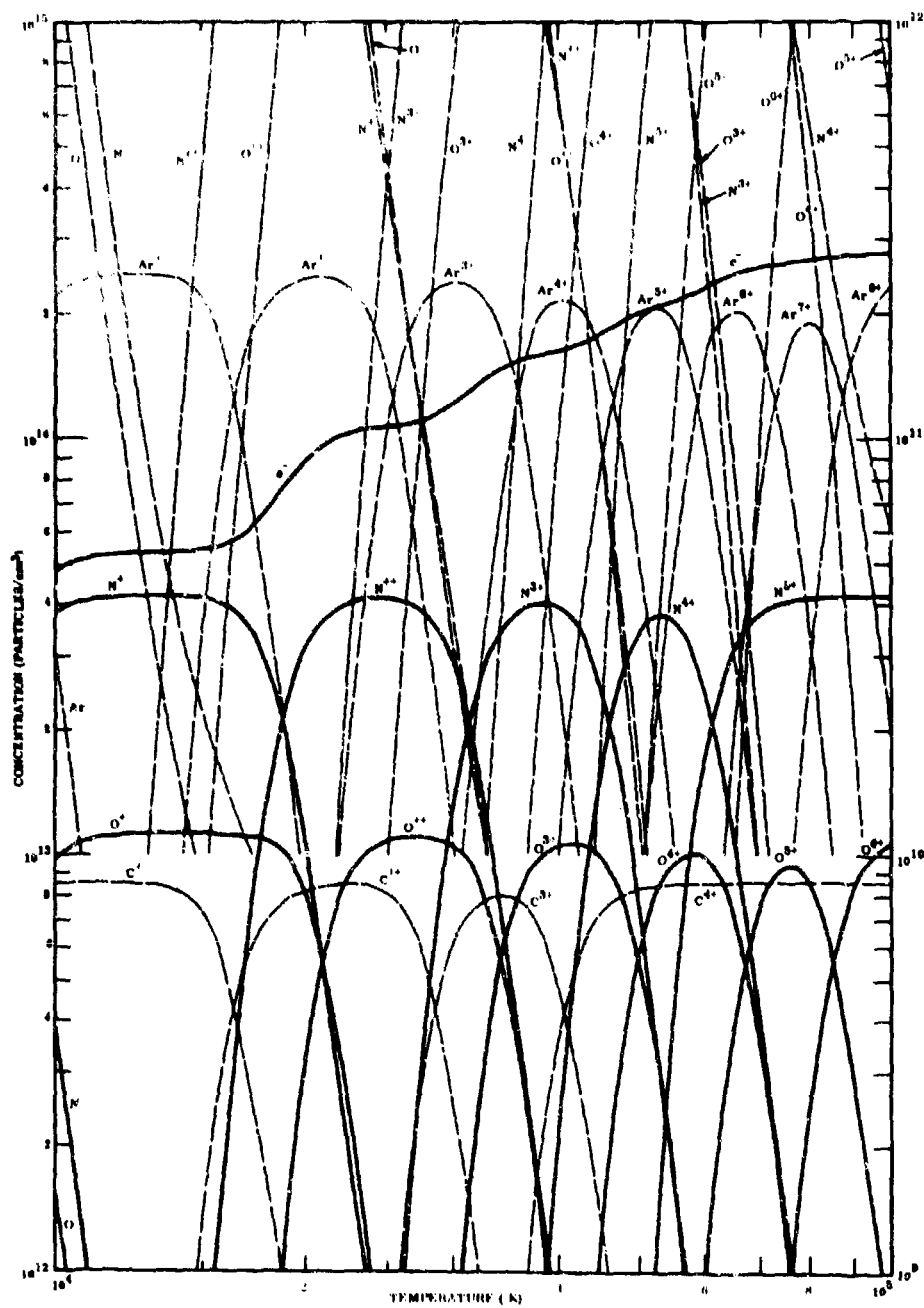


FIG. 2-1 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 10^{-6}$
 SOLID CURVES: USE LEFT-HAND SCALE,
 BROKEN CURVES: USE RIGHT-HAND SCALE

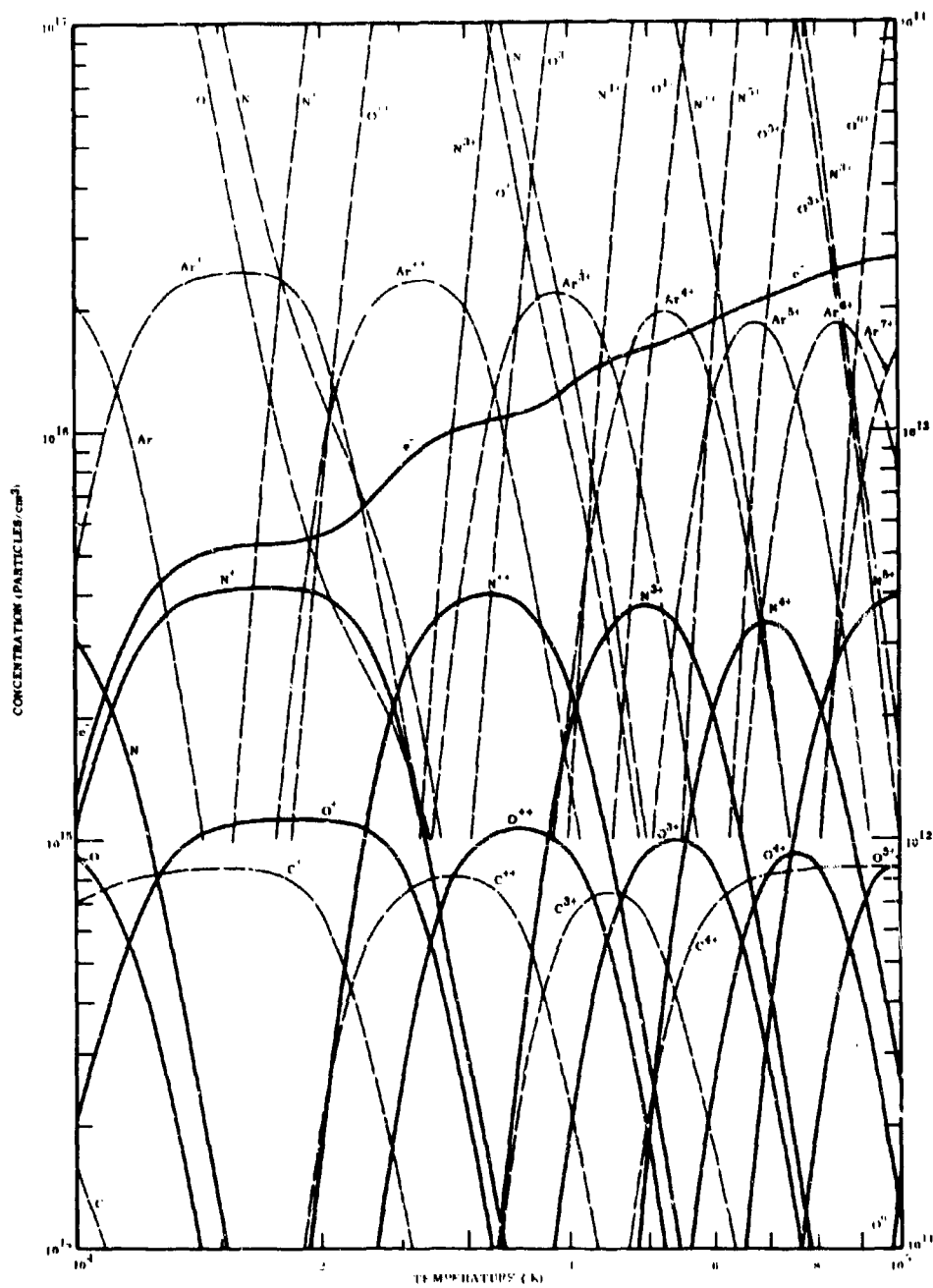


FIG. 2-2 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 10^{-4}$
 SOLID CURVES: USE LEFT-HAND SCALE,
 BROKEN CURVES: USE RIGHT-HAND SCALE

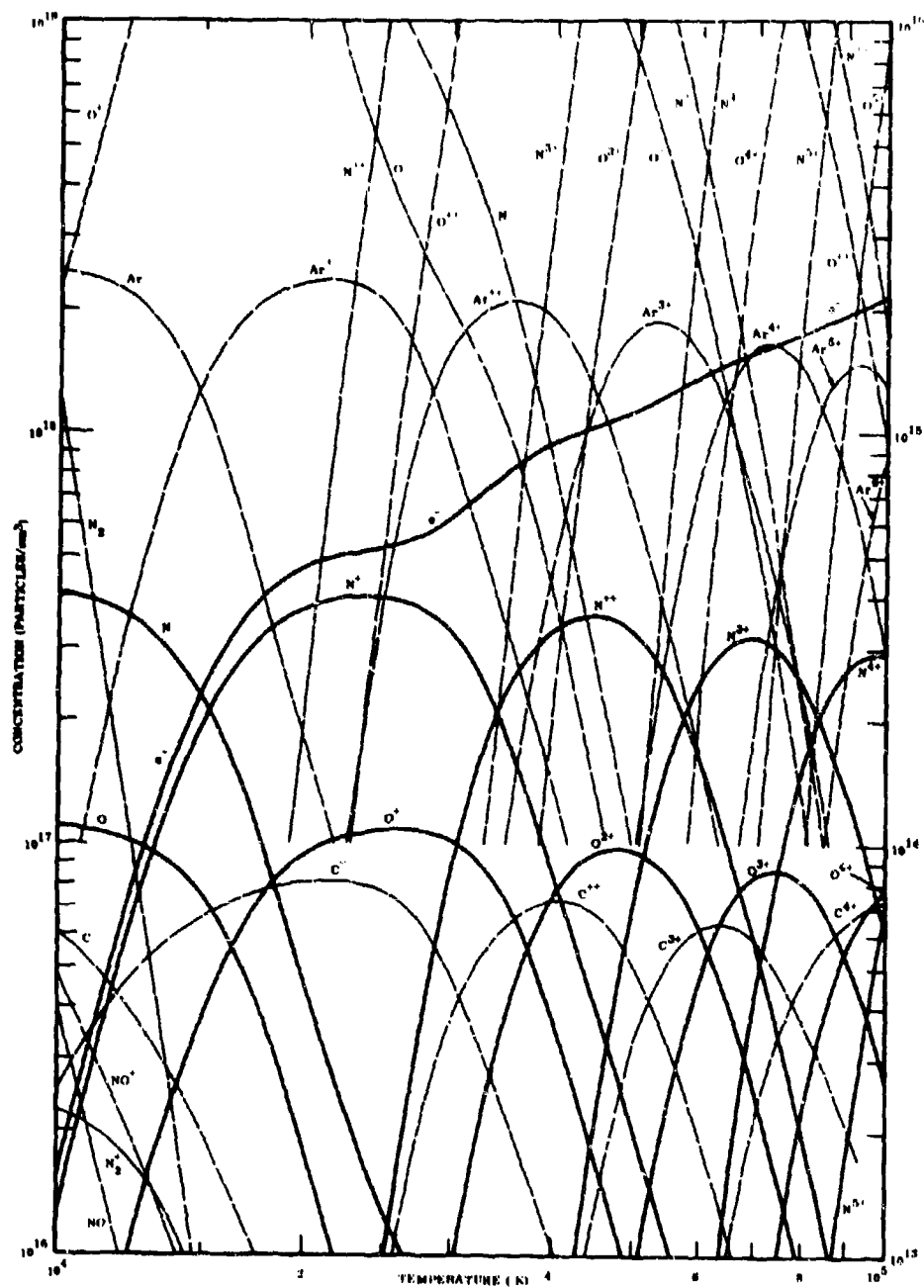


FIG. 2-3 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 10^{-2}$
 SOLID CURVES: USE LEFT-HAND SCALE,
 BROKEN CURVES: USE RIGHT-HAND SCALE

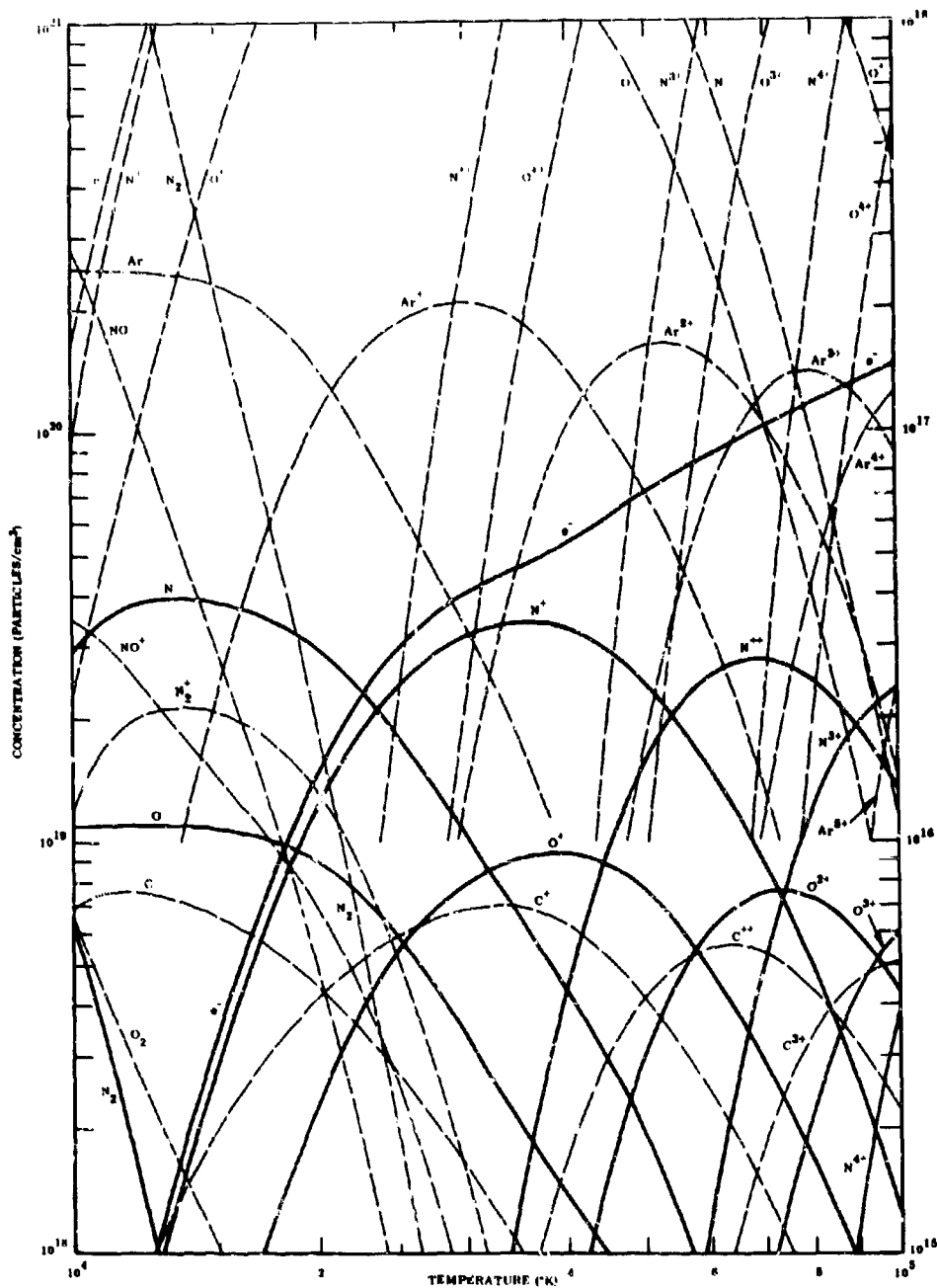


FIG. 2-4 EQUILIBRIUM COMPOSITION OF AIR AT $p/p_0 = 1$
 SOLID CURVES: USE LEFT-HAND SCALE,
 BROKEN CURVES: USE RIGHT-HAND SCALE

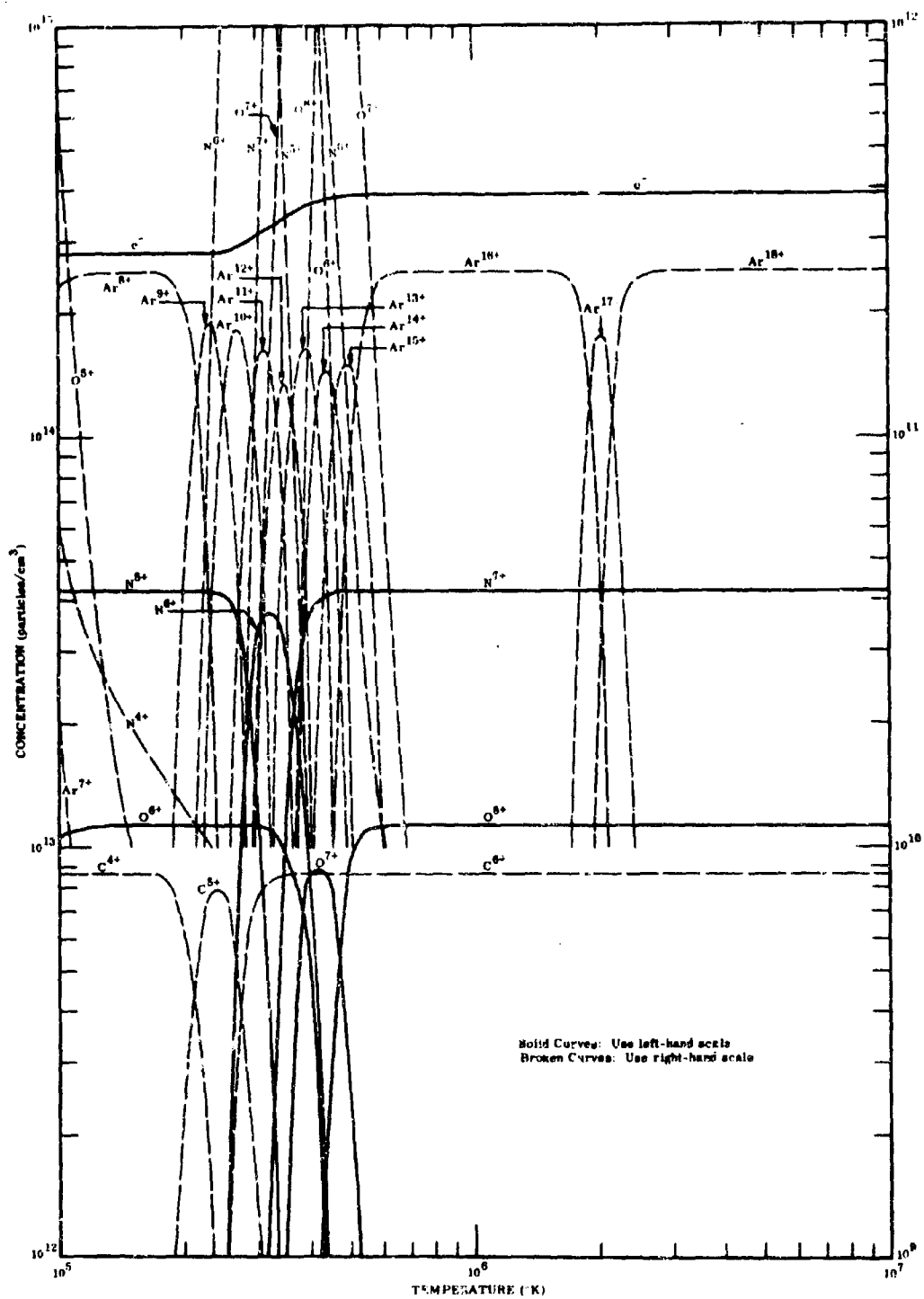


FIG. 2-5 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 10^{-6}$

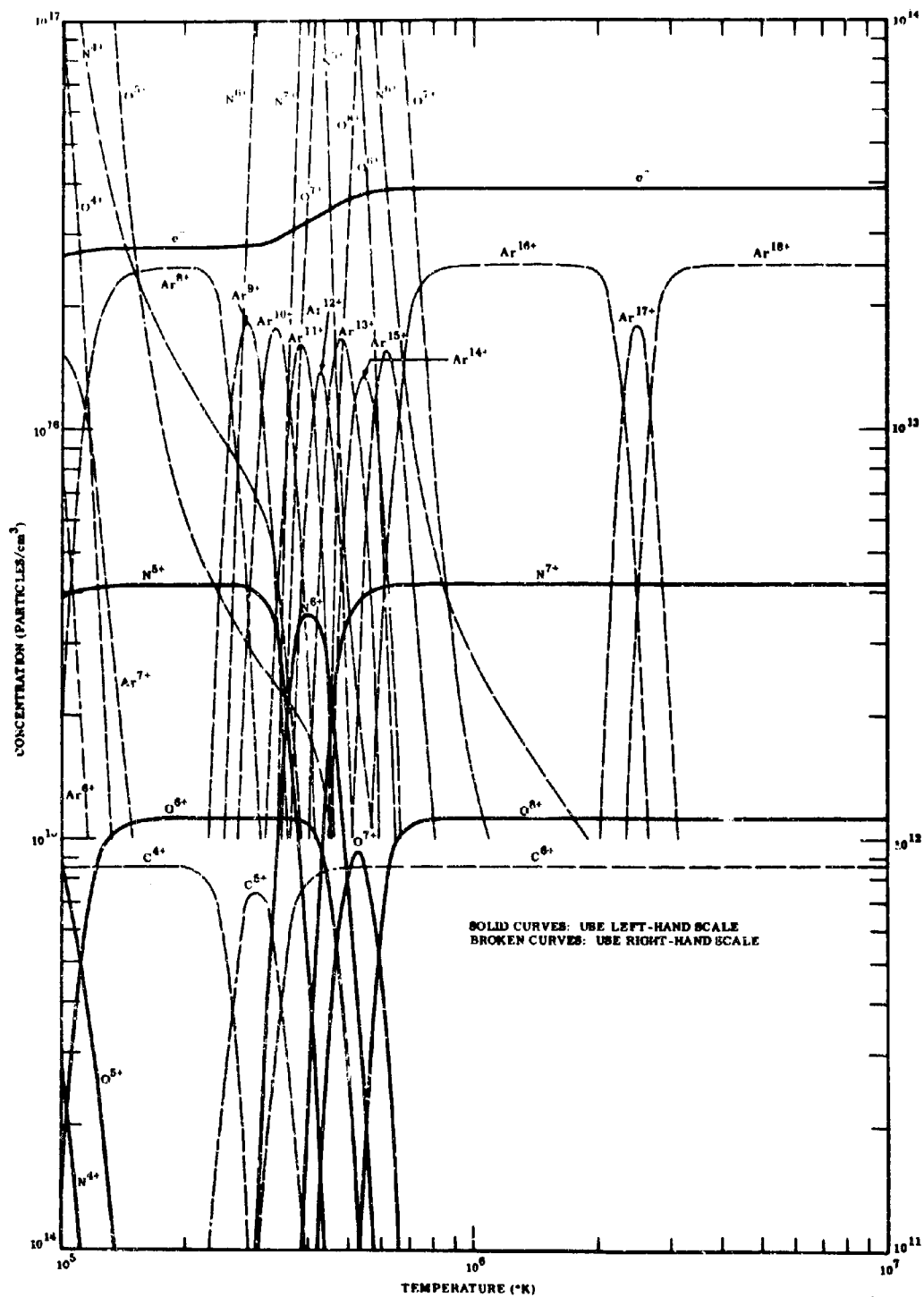


FIG. 2-6 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 10^{-4}$

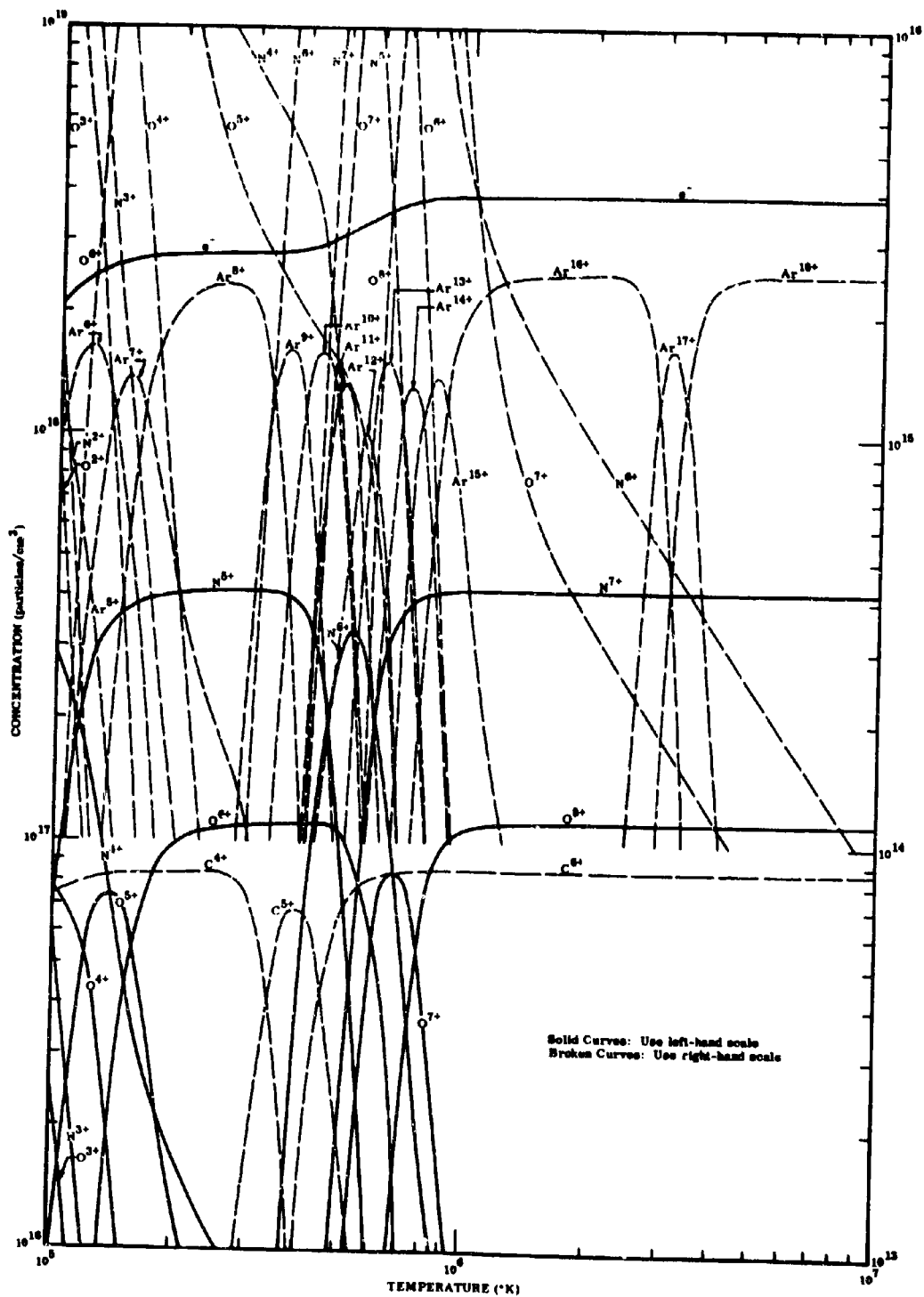


FIG. 2-7 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 10^{-2}$

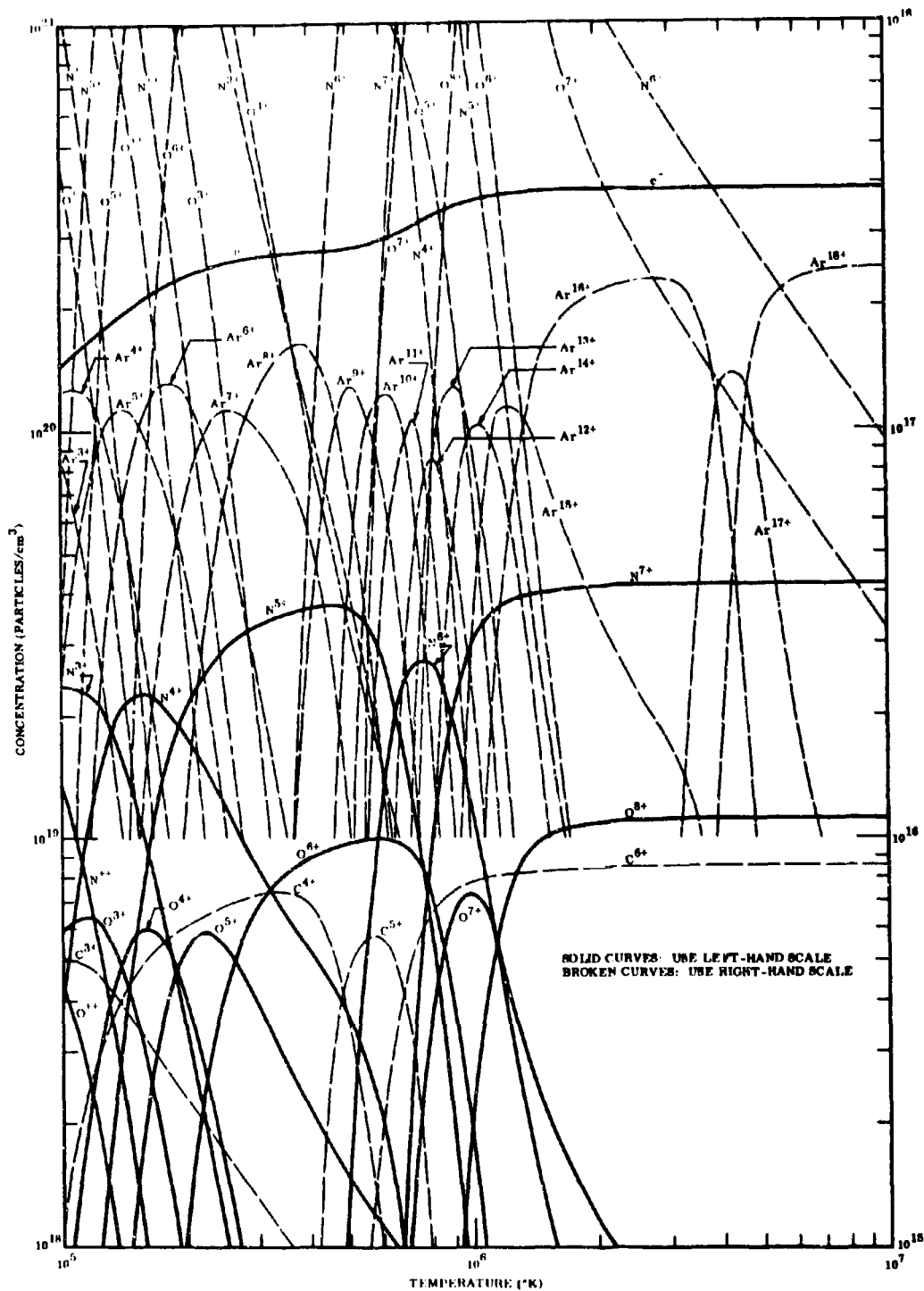


FIG. 2-8 EQUILIBRIUM COMPOSITION OF AIR AT $\rho/\rho_0 = 1$

Appendix A. Composition and Properties of the Atmosphere*
(written by A.D. Anderson)

In this Appendix the main characteristics of the atmosphere are reviewed. The principal regions of the earth's atmosphere are given in Table A-1. Inasmuch as the dominant process in the atmosphere is mixing up to at least 90 km, the proportions of the major constituents are constant up to this altitude. Hence, the mean molecular weight (mass) remains the same from 0 to 90 km and the region is called the "homosphere". Above 90 km, the molecular weight decreases as the composition changes with altitude, because of molecular dissociation and diffusion. This region is called the "heterosphere".

Aside from the compositions of the homosphere and heterosphere, we have also summarized the physics of the upper atmosphere with particular attention to variation of properties and composition with the solar cycle, a subject which has received much recent study.

Composition of the homosphere (lower atmosphere). The composition of dry air near sea level is presented in Table A-2 (U.S. Standard Atmosphere, 1962). Table A-3 gives property values for the homosphere as taken from the U.S. Standard Atmosphere, 1962 (1962). The molecular weight from 0 to 90 km is 28.964. The U.S. Standard Atmosphere, 1962, is a middle-latitude (approximately 45°) year-round mean over the range of solar activity between sunspot minima and sunspot maxima. Seasonal and latitudinal variations of the lower atmosphere properties can be taken into account, if desired, by using values from supplemental atmospheres derived by Cole and Kantor (1963).

* Some of this material has appeared in Space Materials Handbook, Ch. 4, published by Addison-Wesley Pub. Co., 1965, edited by C.G. Goetzl, J.B. Rittenhouse and J.B. Singletary.

TABLE A-1. Principal regions of the earth's atmosphere

Atmospheric region	Sub-region	Approximate altitude range (km)	Characteristic features
Homosphere	Troposphere	0-12	Mean molecular weight constant; heat transfer by convection
	Stratosphere	12-50	Constant molecular weight; increasing temperature, region strongly heated by both earth infrared and solar ultraviolet radiation
	Mesosphere	50-90	Constant molecular weight; decreasing temperature. Mixing processes dominant throughout homosphere
Heterosphere	Thermosphere	90-550	Frequent particle collisions; diffusion process dominant
	Exosphere	550-60,000	Collisions rare; temperature constant with altitude to about 8500 km; diffusion process dominant; heat transfer by conduction.

TABLE A-2. Normal composition of clean, dry atmospheric air
near sea level from U. S. Standard Atmosphere, 1962.

Constituent gas	Content (per cent by volume)	Molecular weight (C ¹² = 12.0000)
Molecular nitrogen	78.084	28.0134
Molecular oxygen	20.9476	31.9988
Argon	0.934	39.948
Carbon dioxide	0.0314	44.00995
Neon	0.001818	20.183
Helium	0.000524	4.026
Krypton	0.000114	83.80
Xenon	0.0000087	131.30
Molecular hydrogen	0.00005	2.01594
Methane	0.0002	16.04303
Nitrous oxide	0.00005	44.0128
Sulfur dioxide	0 to 0.0001	64.0628
Ozone	Summer: 0 to 0.000007 Winter: 0 to 0.000002	47.9982
Nitrogen dioxide	0 to 0.000002	46.0055
Ammonia	0 to trace	17.03061
Carbon monoxide	0 to trace	28.01055
Iodine	0 to 0.000001	253.8088

TABLE A-3. Lower atmosphere neutral properties versus altitude (U.S. Standard Atmosphere, 1962).

Altitude h (km)	Temperature T (°K)	Scale Height (km)	Concentration n (cm ⁻³)	Pressure (dynes cm ⁻²)	Density (gm cm ⁻³)
0	288	8.4	2.54(19)*	1.01(6)	1.22(-3)
5	256	7.5	1.53(19)	5.46(5)	7.36(-4)
10	223	6.6	8.60(16)	2.65(5)	4.24(-4)
15	217	6.4	4.05(16)	1.21(5)	1.95(-4)
20	217	6.4	1.85(16)	5.53(4)	8.89(-5)
25	222	6.5	8.33(17)	2.55(4)	4.00(-5)
30	226	6.7	3.82(17)	1.20(4)	1.84(-5)
35	236	7.0	1.76(17)	5.75(3)	8.46(-6)
40	250	7.4	8.31(16)	2.87(3)	4.00(-6)
45	264	7.8	4.09(16)	1.49(3)	1.97(-6)
50	271	8.0	2.14(16)	7.98(2)	1.09(-6)
60	256	7.6	6.36(15)	2.25(2)	3.06(-7)
70	220	6.6	1.82(15)	5.52(1)	8.75(-8)
80	181	5.4	4.16(14)	1.04(1)	2.00(-8)
90	181	5.4	6.60(13)	1.64	3.17(-9)

*Denotes $n = 2.54 \times 10^{19}$ particles cm⁻³

Minor constituents in the homosphere. Despite the general constancy of the proportions of the major constituents in the homosphere, photochemical and collision mechanisms result in major changes with altitude in the concentrations of the minor constituents. In spite of their small concentrations, some of these minor constituents can be very important. For example, although water vapor usually comprises less than 3 per cent of the gases even with moist conditions at sea level, it absorbs nearly six times as much solar radiant energy as do all the other gases combined. Furthermore, it accounts for nearly all the gaseous absorption of the terrestrial infrared radiation.

Atomic oxygen is present as a minor constituent of the mesosphere, as a result of photodissociation. Detection of the sodium D lines in the night airglow and twilight flash demonstrates the presence of sodium in the mesosphere. Carbon dioxide and the oxides of nitrogen have also been detected in the mesosphere by mass spectrometers of rocket flights. The presence of water vapor in the stratosphere and mesosphere is inferred from the detection of the hydroxyl radical in the night airglow.

Carbon dioxide is also an important absorber of infrared radiation. Many measurements have been made to determine the CO_2 content of the atmosphere. Bray (1959) has weighted the various measurements and gives a median value of 320 ppm. Most of the carbon dioxide measurements have been taken at sea level. Glueckauf (1944) reports values that vary from 250 ppm to 300 ppm for a series of balloon flights over England. He indicates that samples taken in the stratosphere were not different from those taken at ground level. Measurements indicate that the minimum concentrations of CO_2 are approximately 150 ppm and are found in polar air; however, the polar air values vary widely. The maximum concentrations have been measured off the west coast of Africa and may rise to 700 ppm locally. The CO_2 concentration is greater in urban than in rural areas, continental air masses show higher concentrations than air masses over the oceans, and night air usually contains more CO_2 than daytime air.

Water vapor is the most variable constituent in the atmosphere and is perhaps the most difficult to measure at small concentrations and at low temperatures. Measurements indicate that the mixing ratio of water vapor in the atmosphere decreases rapidly from ground level to the tropopause. In the stratosphere, the vapor content changes more slowly and usually decreases with altitude. Since the maximum concentration of water vapor is temperature dependent, its normal altitude profile is in accord with the temperature profile in the atmosphere. Gutnick (1962) has derived a water vapor profile for temperate latitudes, based on the best water vapor measurements to date. The general features of this model are that the mixing ratio decreases from about 6,150 ppm (mg/kg) at the surface to 9 ppm at 16 km, then increases slightly with altitude. However, the water vapor increase above 16 km is now considered dubious. Bandeen et al. (1969) infer the relative planetary distribution of atmospheric moisture from measurement within the 6.3 micron band of water vapor made from Tiros meteorological satellites.

Ozone, produced by the action of solar ultraviolet radiation on molecular oxygen, is found between 15 and 40 km, with peak values between 22 and 35 km. The total amount of ozone in temperate latitudes is about 2.7 mm on the average for the whole year; that is, if the total amount of ozone in the atmosphere could be concentrated at the surface it would make a layer of this height at STP. There are considerable changes in the amount of ozone from day to day which are correlated with weather changes. In particular the relation to pressure changes is well indicated. Ozone also appears to have a slight seasonal and latitudinal variation. Figure A-1 shows the measurements for various latitudes reported by Miller (1960). The ozone distributions shown in the figure can be considered as representative of the atmosphere over the Tropical, Temperate, and Arctic regions of the earth. Atmospheric absorption by ozone is most important in the ultraviolet region of the spectrum and near 9.6 microns in the infrared; a minor absorption band also occurs near 4.8 microns. A good review article on ozone has been presented by Götz (1951).

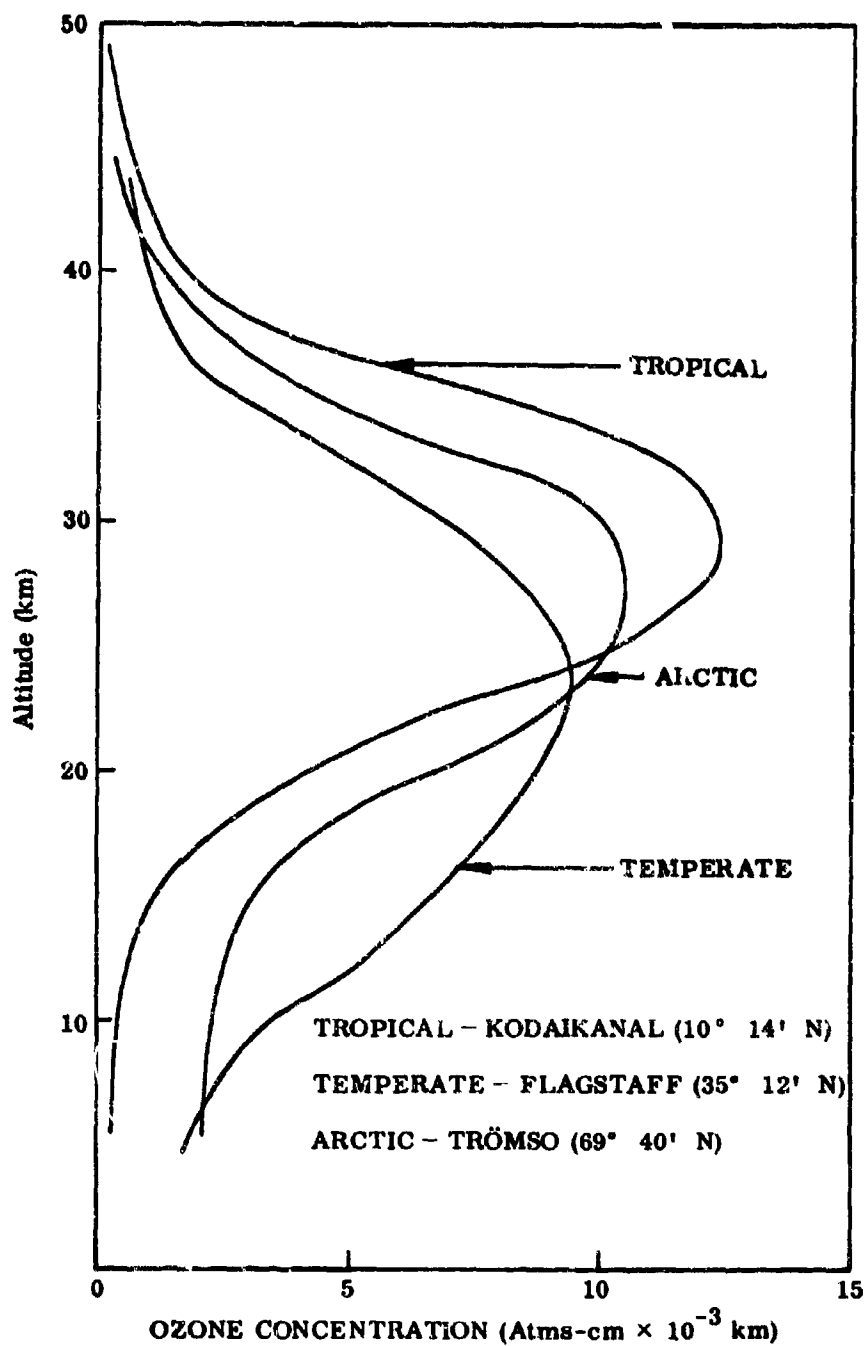


FIG. A-1 OZONE DISTRIBUTION

Composition of the heterosphere (upper atmosphere). The neutral atmosphere above 100 km is composed almost wholly of molecular nitrogen and oxygen and atomic nitrogen, oxygen, helium, and hydrogen; the relative concentrations of these constituents depend strongly on altitude and temperature. The composition of the upper atmosphere can be explained, at least in a qualitative sense, by noting the types of photochemical reactions that can occur and how the reaction products are affected by mixing and diffusion. In the following paragraphs, the reactions leading to the neutral constituents will be discussed first, followed by the ion reactions.

At about 100 km, the absorption of solar radiation with wavelengths shorter than 1850Å down to about 1300Å leads to the dissociation of oxygen molecules into oxygen atoms. For wavelengths shorter than 1026Å, the oxygen molecule can be ionized; this ionization is normally followed by a dissociative recombination producing atomic oxygen. Although the oxygen atoms can recombine into molecules, photochemical equilibrium, where the rates of dissociation and recombination are equal at each altitude, does not prevail. Instead, vertical transport due to both diffusion and mixing plays an important role in determining the atomic and molecular concentrations at various levels near 100 km. More oxygen dissociates than recombines above 100 km, due to the rapid fall-off with altitude of the recombination processes. Below 100 km, collisions occur frequently enough for recombination to prevail, hence more oxygen recombines than dissociates. Consequently, there is a steady flux of molecular oxygen upward and atomic oxygen downward through the 100 km level, due to the effects of diffusion and mixing. Atomic oxygen is the most important constituent in the upper thermosphere.

The most active process leading to the dissociation of molecular nitrogen is ionization followed by dissociative recombination, producing

atomic nitrogen. Atomic nitrogen can react with molecular oxygen to form nitric oxide and atomic oxygen. The nitric oxide in turn reacts with atomic nitrogen to form molecular nitrogen and atomic oxygen. The effectiveness of these reactions, together with the slowness with which molecular nitrogen dissociates, causes atmospheric nitrogen to remain predominantly in molecular form.

Photodissociation of water vapor and methane near 80 km constitute the principal sources of atomic hydrogen. Owing to the small mass of the hydrogen atom compared to other atmospheric constituents, the hydrogen concentration does not decrease with altitude as rapidly as do the other atmospheric constituents in the altitude region where diffusion proceeds rapidly; hence atomic hydrogen becomes an increasingly important atmospheric constituent with increasing altitude. However, atomic hydrogen is such a minor constituent in the thermosphere that it does not become the dominant constituent until 2000 to 5000 km altitude, remaining so until about 20,000 km where the hydrogen ion becomes dominant. The source of atomic hydrogen near 80 km can be expected to remain essentially constant through the sunspot cycle, but the rate of escape, depending on the temperature at the base of the exosphere, varies with the sunspot cycle. The escape will be relatively rapid when the temperature is high, and the concentration of hydrogen will be correspondingly low in the exosphere near sunspot maximum. The escape is relatively slow when the temperature is low, so that the concentration must be comparatively high near sunspot minimum.

Nicolet (1961) showed that helium atoms are an important constituent in the lower exosphere. He explains the high densities derived from the rate of change of the period of the Echo satellite by the presence of helium. Evidently, atomic oxygen, nitrogen or hydrogen cannot explain the slow density decrease between 750 and 1500 km. Atomic oxygen is the most important constituent in the upper thermosphere, but atomic helium

dominates over atomic oxygen somewhere above 800 to 1000 km. Atomic hydrogen dominates over helium somewhere above 2000 to 5000 km. Although the total concentration of the neutral particles is at least an order of magnitude greater than that of the ions up to about 2000 km altitude, the ion concentrations finally become significant at the higher altitudes.

The primary ions formed in the E region (85 to 140 km) of the ionosphere are N_2^+ , O_2^+ , and O^+ . The N_2^+ ions dissociatively recombine very rapidly, and they may also react with oxygen, so that the concentration of N_2^+ is small. Ion-atom exchange reactions of the type



proceed very rapidly, so that the reactions of O^+ with O_2 and N_2 quickly remove the O^+ ions and produce either NO^+ or O_2^+ . The dominant ions in the F_1 region (140 to 200 km) are NO^+ and O_2^+ near the lower altitude boundary, with a gradual transition to O^+ as the principal ion at the upper boundary. O^+ becomes the dominant ion because of the rapid decrease with altitude of the neutral molecular constituents that otherwise would tend to eliminate O^+ by reaction (A1.). In the F_2 region (200 to 800 km), the ions present are O^+ and N^+ , with O^+ greatly predominant. The helium ion starts to become dominant between 800 and 1400 km (Bourdeau and Bauer, 1963), depending on atmospheric temperature. Likewise, protons become the dominant ion between about 1400 to 4000 km. Thus, there are two transition regions (from oxygen to helium ions and from helium to hydrogen ions) in the upper ionosphere rather than a single transition from oxygen to hydrogen as previously believed. The outer portion of the earth's atmosphere (extending from about 20,000 km to at least 60,000 km above the earth's surface) consists

mainly of protons. The protons predominate in the earth's outer atmosphere over the hydrogen atoms because the confining effect of the earth's magnetic field makes their rate of escape to space much less than for the neutral hydrogen atoms. According to Johnson (1960), the solar wind cannot penetrate the geomagnetic field; therefore, the upper boundary of the earth's atmosphere and magnetic field (magnetosphere) are the same.

Even under normal solar wind conditions, the magnetosphere does not present a simple boundary to the earth's atmosphere. On the day side of the earth, a cavity, which is filled with the earth's magnetic field and atmosphere, is formed in the solar wind. At the same time, the geomagnetic field is deformed by the solar wind. A schematic representation of the cavity and deformed geomagnetic field during a moderately strong solar wind is shown in Fig. A-2 (Johnson, 1960). The boundary of the magnetic field in the direction facing the sun is about 10 earth radii from the center of the earth. The widest portion of the magnetic field downwind from the earth is more than 12 earth radii in width and may be over 18. The length of this tail is presently unknown and undoubtedly depends on the intensity and temperature of the particles in the solar wind.

Physics of the atmosphere. Assuming that the earth's atmosphere is a continuous medium consisting of a gas in static equilibrium, the equation connecting the pressure P and density ρ at any altitude h is

$$dP = -g\rho dh, \quad (A2.)$$

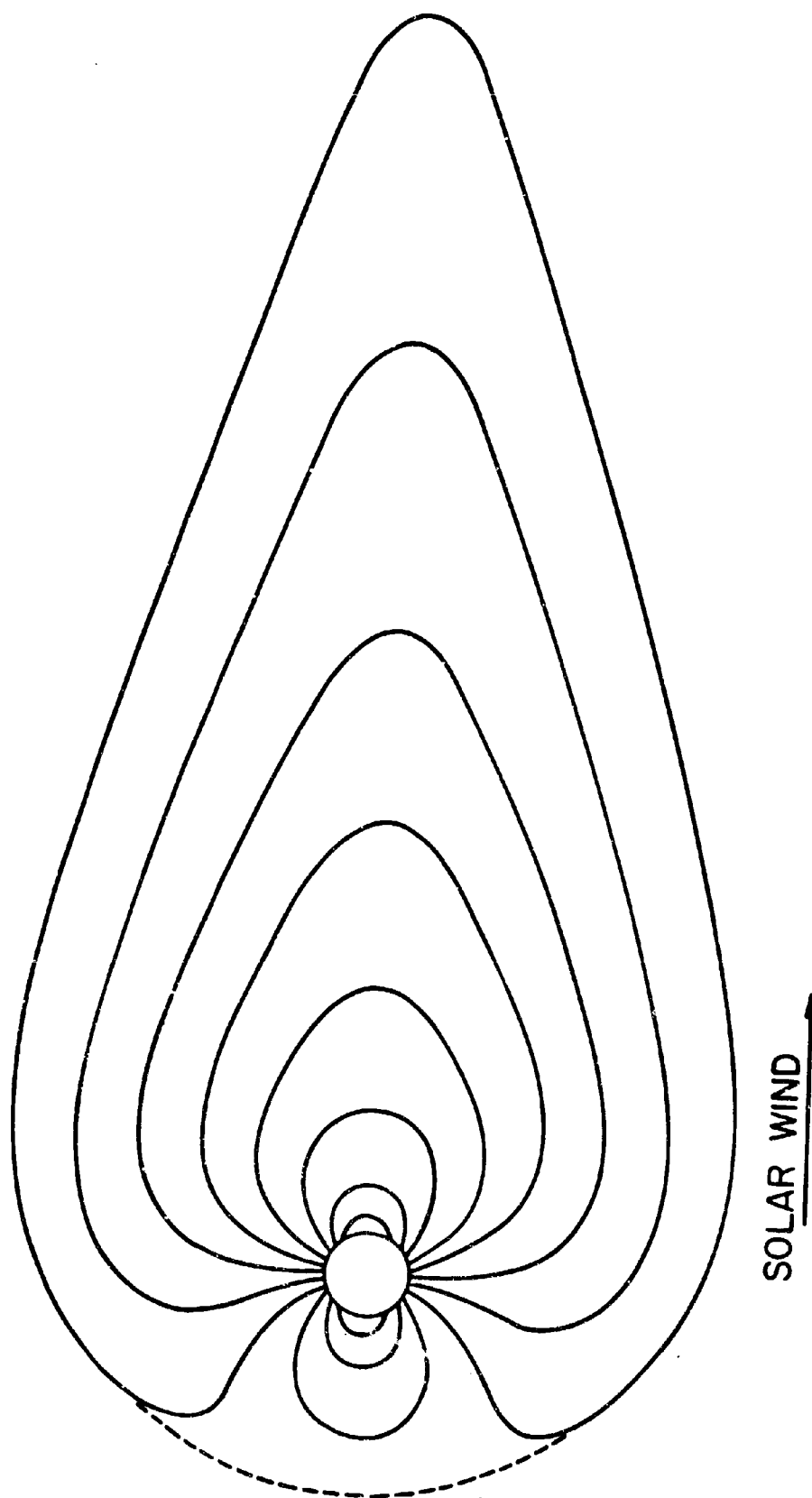


FIG. A-2 THE GEOMAGNETIC FIELD AS DEFORMED BY A MODERATELY STRONG SOLAR WIND BLOWING PERPENDICULARLY TO THE MAGNETIC AXIS, ACCORDING TO JOHNSON (1960)

where g is the gravitational acceleration. The variation in g with altitude can be taken into account by using the relationship

$$g = g_0 R_0^2 / (R_0 + h)^2 , \quad (A3.)$$

where g_0 is the acceleration of gravity at the earth's surface and R_0 is the earth's radius. Eq. (A2.) is the hydrostatic equation in differential form. Further, let m be the mean molecular mass of the gas and n denote the number density or concentration; the density ρ is then

$$\rho = n m . \quad (A4.)$$

Since the terrestrial atmosphere can be approximated by a perfect gas, the pressure is given by the equation of state

$$P = n k T , \quad (A5.)$$

where T is the temperature and k the Boltzmann constant (1.38×10^{-16} erg deg⁻¹).

Multiplying both sides of Eq. (A4.) by g and dividing the result into Eq. (A5.) gives

$$P/\rho \cdot g = k T/m g = H , \quad (A6.)$$

where $H = k T/m g$ is known as the pressure scale height, a parameter convenient for atmospheric calculations.

From Eqs. (A2.) to (A4.) one can obtain

$$\frac{dP}{P} = - \frac{m g}{k T} dh . \quad (A7.)$$

Then, integrating Eq.(A7.) gives the barometric law

$$\frac{P}{P_0} = \exp \left[- \int_0^h \frac{m g}{k T} dh \right] . \quad (A8)$$

From Eqs.(A5.) and (A8.) we have

$$\frac{n}{n_0} = \frac{T_0}{T} \exp \left[- \int_0^h \frac{m g}{k T} dh \right] , \quad (A9)$$

and Eqs.(A4.) and (A9.) yield

$$\frac{\rho}{\rho_0} = \frac{m T_0}{m_0 T} \exp \left[- \int_0^h \frac{m g}{k T} dh \right] . \quad (A10)$$

In Eqs.(A8.) to (A10.), P , n , and ρ are the pressure, particle concentration, and density, respectively, at altitude h , and P_0 , n_0 , and ρ_0 are the corresponding values at an arbitrary reference level at which h is assigned the value zero.

Eqs.(A2.) to (A10.) are applicable in the atmosphere where the escape into space of a constituent is not important. The hydrostatic Eq.(A2.) is based on the concept of LTE, i.e., collisions between particles are frequent enough so that there is a complete statistical exchange of particle energy and momentum in the volume under consideration. In the thermosphere the particles collide often enough to insure a Maxwellian velocity distribution and the existence of a meaningful kinetic temperature.

In the exosphere, above about 550 km, collisions are sufficiently reduced so that the existence of a Maxwellian distribution, and consequently, the validity of applying the hydrostatic relationship, must be examined anew. Liouville's theorem can be used to show that the Maxwellian velocity distribution present below the base of the exosphere applies equally well in the exosphere, provided that the escape of particles to space is negligible. The atmosphere is so rarefied in the exosphere that there is little solar radiation absorbed. Also, there are no energy loss mechanisms to disturb the Maxwellian velocity distribution. At the temperatures present, the distribution is disturbed only by the escape of neutral hydrogen from well above the base of the exosphere. It follows that the maximum altitude in the atmosphere where the hydrostatic equation is applicable can be determined by calculating the altitude in the exosphere where the density of the neutral hydrogen starts to be significantly affected by the escape of hydrogen atoms. Consequently, the greatest error involved in using the hydrostatic assumption will occur during the day near sunspot maximum conditions, inasmuch as temperatures are highest then. Calculations (Anderson and Francis, 1964) indicate that the error will start to become significant above about 5000 km altitude. For average sunspot conditions, the altitude is about 8500 km. For sunspot minimum conditions, the error will not be significant below 10,000 km.

Inasmuch as the atmosphere consists of a mixture of gases subject to a force field, the equilibrium distribution of its constituents can be expected to show some degree of diffusive separation. Although turbulent mixing below 100 km does not allow the development of diffusive equilibrium distributions, above this altitude there is experimental evidence that

diffusive equilibrium does exist. In the geopotential field, diffusive equilibrium gives concentration distributions for neutral particles that vary exponentially with the geopotential, with a more rapid decrease in concentration with increasing geopotential for the heavier constituents in the atmosphere than for the lighter. The result is a static distribution of gas constituents under the action of the external force field, which may be expressed by the barometric law Eq. (A8.) that applies for each atmospheric constituent independently of the others.

The concept that the atmosphere extending above 400 km over a given location on the earth's surface is isothermal in the sense that the temperature does not vary with altitude is now well established. In the tenuous gas of the upper thermosphere the thermal conductivity is independent of the pressure while the heat capacity varies linearly with density. Consequently, the conductivity is very large compared to the heat capacity. Above 400 km, the absorption of energy is negligible and the relatively high heat conductivity eliminates temperature differences; hence the kinetic temperature is nearly constant with altitude for many thousands of kilometers. The kinetic temperature can only be determined for a gas with a Maxwellian velocity distribution. As pointed out under the discussion of the accuracy of the hydrostatic assumption, the Maxwellian velocity distribution applies in the exosphere provided that the escape of particles to space is negligible. For hydrogen, the escape of atoms is comparatively rapid so that the velocity distribution in the upper exosphere beyond 10,000 km is not Maxwellian. Therefore, the hydrogen atoms in the upper exosphere have a non-Maxwellian distribution that becomes more pronounced with altitude.

Under these circumstances the concept of kinetic temperature is not entirely applicable, although an effective temperature can be defined by considering the average energy of the hydrogen atoms (Sharp, 1962).

Variation of upper-atmosphere properties and composition with the solar cycle. A principal problem connected with atmospheric structure is to calculate accurate values for all the primary properties in the heterosphere (above 90 km) as a function of time, location, and date by taking into account the relevant processes. The primary atmospheric properties are temperature, pressure, density, and mean molecular mass (or composition). To account for their variations, the following factors must be considered: (a) time (hour, day, sun-rotation period, season, year, sunspot cycle); (b) location (altitude, latitude, longitude); (c) solar characteristics (ultraviolet radiation, solar plasma and associated magnetic storms); and (d) particle processes (conduction, diffusion, mass transport, photoionization, dissociation, recombination, particle escape into space). The problem of describing upper atmospheric behavior is difficult because many of the above elements are interrelated.

The magnitudes of the atmospheric properties in the upper atmosphere are derived from measurements made from satellites, rockets, meteor observations, sky emissions, and the propagation of sound and radio waves. The data are sparse and contain much uncertainty above 200 km. The density (drag) data resulting from tracking satellites are the most precise, and by far, the most numerous. Study of the orbital decay data has clearly established that two major systematic density variations occur: (1) a solar activity effect in which variations in atmospheric heating and density take place above 90 km due to variations in solar

ultraviolet radiation; and (2) a diurnal (time-of-day) effect, in which the solar heating results in the atmosphere bulging toward the sun, producing relatively large density increases at altitudes above 300 km in the sunlit region of the earth. At 800 km, due to effect (1), the density can be 40 times as high during solar maximum conditions than during solar minimum, and due to effect (2), 15 times as high during the day than during the night. The combination of both (1) and (2) can result in densities 500 times as high at 800 km during solar maximum (day) than during solar minimum (night). This extreme variability in density also applies to pressure. Upper atmosphere density variations with latitude and season are much smaller than the two primary effects above. In addition, there is a conspicuous drag effect on satellites associated with major magnetic storms and the resulting heating is such that the relative effect on density increases with altitude. At present, it is not possible to make more than a rough estimate of the effect of magnetic heating on the density; fortunately, major magnetic storms are fairly rare and the associated heating is transient.

Upper-atmosphere measurements are not made on a regular enough basis, either in kind, time or space, to allow them to be used alone, without the aid of a model, to represent atmospheric conditions. The approach followed by most models used to derive atmospheric properties is to assume altitude profiles for some of them in order to calculate the remainder. Almost all the models deal with data referring only to density, pressure and/or temperature. The altitude variation of the mean molecular mass is introduced somewhat arbitrarily and, therefore, a physically

consistent vertical distribution of the composition cannot be obtained. A new method has been devised for computing atmospheric properties (Anderson and Francis, 1964). In this model, no major assumptions are made regarding the property profiles. Instead, the primary properties are calculated by starting with an empirical density profile from a density model as the chief input, assuming diffusive equilibrium conditions above 110 km and isothermal conditions with altitude above 400 km. The density profile, used as starting input for this new property model, is represented in a previous empirical model (Anderson, 1964) as a function of local time and solar activity from 200 to 800 km. This density model can be used to calculate the marked variations in density that occur from day to day by taking corrected values of the 10.7-cm solar flux (called S') as an index of the sun's extreme ultraviolet radiation. The remaining properties are derived by using the hydrostatic equation and equation of state, that relate density, pressure, temperature, and mean molecular mass as a function of altitude (Eqs. (A8.) to (A10.), together with boundary values based on measurements.

The equations embodying the model are programmed for an IBM-7090 computer. The results of the computations made from the model are given in two tables that present the neutral atmospheric properties and composition vs. altitude from 100 to 10,000 km. Tables A-4 and A-5 exhibit the properties and number densities of the various constituents vs. altitude near sunspot maximum and near sunspot minimum, respectively. The S' value used for Table A-4 ($S' = 250$) is an average value for September, 1959, the month immediately following the Argus high-altitude

nuclear detonation. The S' value used for Table A-5 ($S' = 44$) is an average value for July and August, 1962 ($S' = 42$ for July; $S' = 46$ for August), the two months following the Starfish high-altitude shot. Both tables are for $t = 21$ hr.; the density for this time has been found to closely approximate the diurnally averaged density or the sum of the densities for every hour of the day divided by 24. Calculations of density from the model are based on neutral particles only. The ions do not contribute significantly to the total (ambient) density below 2000 km. Above this altitude, the contribution of H^+ should be taken into account in any calculation of the ambient density. The neutral density is corrected for the departure from a Maxwellian velocity distribution caused by the escape of atomic hydrogen from the earth's exosphere. The temperature used to calculate the total pressure in the exosphere from A-5 is the kinetic temperature that is assumed to be locally isothermal vertically to 10,000 km. Hence, the computed pressure will be somewhat higher than the ambient pressure (a function of the effective temperature) of the neutral constituents above about 5000 km.

TABLE A-4. Upper atmosphere neutral properties versus altitude near sunspot maximum

Altitude h (km)	Temp. T (°K)	Scale height h _s (km)	Mean rel. wt.	Concent. n (cm ⁻³)	Pressure (dynes cm ⁻²)	Density (gm cm ⁻³)	n(H) (cm ⁻³)	n(He) (cm ⁻³)	n(C) (cm ⁻³)	n(N ₂) (cm ⁻³)	n(O ₂) (cm ⁻³)	n(A) (cm ⁻³)
100	230	7	28.43	1.07(13)*	3.40(-1)	5.05(-10)	4.17(5)	3.78(8)	6.81(11)	7.03(12)	2.88(12)	1.05(11)
120	330	12	27.15	7.28(11)	3.82(-2)	3.28(-11)	3.22(4)	7.05(7)	1.27(11)	3.81(11)	2.14(11)	4.73(9)
140	583	20	25.48	1.34(11)	1.08(-2)	5.66(-12)	2.07(4)	3.80(7)	3.85(10)	6.48(10)	3.00(10)	4.51(8)
160	796	29	24.11	4.33(10)	4.76(-3)	1.73(-12)	1.46(4)	2.44(7)	1.66(10)	1.89(10)	7.45(9)	8.87(7)
180	969	38	22.98	1.86(10)	2.62(-3)	7.48(-13)	1.17(4)	1.81(7)	9.13(9)	7.64(9)	2.81(9)	2.65(7)
200	1080	44	22.02	1.08(10)	1.61(-3)	3.96(-13)	1.03(4)	1.49(7)	5.80(9)	3.75(9)	1.26(9)	1.08(7)
240	1165	52	20.38	4.40(9)	7.07(-4)	1.49(-13)	9.18(3)	1.18(7)	2.83(9)	1.17(9)	3.36(8)	1.96(6)
300	1182	59	18.51	1.48(9)	2.42(-4)	4.56(-14)	8.56(3)	9.33(6)	1.17(9)	2.44(8)	5.65(7)	2.11(5)
340	1183	63	17.62	7.72(8)	1.26(-4)	2.26(-14)	8.25(3)	8.07(6)	6.57(8)	8.87(7)	1.78(7)	4.95(4)
400	1183	68	16.69	3.05(8)	5.05(-5)	8.56(-15)	7.82(3)	6.52(6)	2.80(8)	1.99(7)	3.21(6)	5.86(3)
500	1183	75	15.59	7.61(7)	1.24(-5)	1.97(-15)	7.17(3)	4.60(5)	6.96(7)	1.74(6)	1.95(5)	1.81(2)
600	1183	84	14.26	2.15(7)	3.51(-6)	5.08(-16)	6.53(3)	3.28(6)	1.80(7)	1.64(5)	1.33(4)	6.17
700	1183	102	12.09	7.23(6)	1.81(-6)	1.45(-16)	6.01(3)	2.36(6)	4.04(6)	1.65(4)	9.64(2)	
800	1183	137	9.28	3.08(6)	5.02(-7)	4.74(-17)	5.55(3)	1.72(6)	1.35(6)	1.76(3)	7.51(1)	
900	1183	192	6.82	1.66(6)	2.70(-7)	1.62(-17)	5.13(3)	1.26(6)	3.90(5)	2.01(2)	6.27	
1000	1183	253	5.32	1.05(6)	1.72(-7)	9.30(-18)	4.75(3)	9.32(5)	1.17(5)	2.43(1)		
1400	1183	372	4.01	3.06(5)	4.99(-8)	2.04(-18)	3.57(3)	3.01(5)	1.27(3)			
2000	1183	444	3.90	7.01(4)	1.14(-8)	4.53(-19)	2.44(3)	6.76(4)	3.24			
4000	1183	915	2.91	2.56(3)	4.18(-10)	1.23(-20)	9.33(2)	1.62(3)				
6000	1183	2301	1.64	6.07(2)	9.91(-11)	1.66(-21)	4.77(2)	1.30(2)				
10,000	1183	6128	1.08	1.97(2)	3.25(-11)	3.57(-22)	1.94(2)	5.31				

*Denotes n = 1.07 x 10¹³ particles cm⁻³

TABLE A-5. Upper atmosphere neutral properties versus altitude near sunset minimum

Altitude h (km)	Temp. T (°K)	Solar ht. (km)	Mean mol. wt.	Conc. n (cm ⁻³)	Pressure (dynes cm ⁻²)	Density (gm cm ⁻³)	n (H) (cm ⁻³)	n (He) (cm ⁻³)	Constituent concentrations n (O) (cm ⁻³)	n (N ₂) (cm ⁻³)	n (O ₂) (cm ⁻³)	n (A) (cm ⁻³)
100	206	6	28.22	1.04 (13)	2.94 (-1)	4.86 (-10)	7.46 (5)	1.55 (6)	4.83 (11)	8.00 (12)	1.82 (12)	6.45 (10)
120	287	9	27.22	5.31 (11)	2.11 (-2)	2.40 (-11)	1.12 (5)	1.21 (7)	5.85 (10)	4.04 (11)	6.78 (10)	1.39 (9)
140	418	14	25.72	6.37 (10)	3.67 (-3)	2.72 (-12)	7.21 (4)	6.40 (6)	1.40 (10)	4.40 (10)	5.58 (9)	6.96 (7)
160	595	22	24.28	1.46 (10)	1.18 (-3)	5.88 (-13)	4.92 (4)	3.81 (6)	4.84 (9)	8.79 (9)	9.47 (8)	7.97 (6)
180	740	29	23.03	5.19 (9)	5.30 (-4)	1.96 (-13)	3.76 (4)	2.63 (6)	2.23 (9)	2.70 (9)	2.54 (6)	1.63 (6)
200	876	35	21.95	2.40 (9)	2.84 (-4)	8.75 (-14)	3.16 (4)	2.04 (6)	1.24 (9)	1.07 (9)	9.03 (7)	4.64 (5)
240	949	44	20.18	7.76 (8)	1.04 (-4)	2.60 (-14)	2.66 (4)	1.48 (6)	5.08 (8)	2.48 (8)	1.73 (7)	6.06 (4)
300	1004	51	18.24	2.13 (8)	2.96 (-5)	6.46 (-15)	2.40 (4)	1.10 (6)	1.72 (8)	3.82 (7)	2.04 (6)	4.24 (3)
340	1007	55	17.36	9.99 (7)	1.39 (-5)	2.88 (-15)	2.30 (4)	9.28 (5)	8.68 (7)	1.16 (7)	5.24 (5)	7.74 (2)
400	1008	59	16.47	3.46 (7)	4.82 (-6)	9.45 (-16)	2.16 (4)	7.21 (5)	3.18 (7)	2.00 (6)	7.04 (4)	6.30 (1)
500	1008	65	15.32	6.94 (6)	9.51 (-7)	1.74 (-16)	1.95 (4)	4.80 (5)	6.32 (6)	1.15 (5)	2.69 (3)	1.06
600	1008	76	13.50	1.62 (6)	2.25 (-7)	3.53 (-17)	1.76 (4)	3.23 (5)	1.27 (6)	7.17 (3)	1.13 (2)	
700	1008	102	10.36	5.03 (5)	7.08 (-8)	8.75 (-18)	1.60 (4)	2.29 (5)	2.73 (5)	4.83 (2)	5.16	
800	1008	154	7.04	2.26 (5)	3.15 (-8)	2.66 (-18)	1.45 (4)	1.51 (5)	6.10 (4)	3.51 (1)		
900	1008	223	4.99	1.32 (5)	1.84 (-8)	1.10 (-19)	1.33 (4)	1.05 (5)	1.42 (4)	2.74		
1000	1008	282	4.05	8.91 (4)	1.24 (-8)	6.00 (-19)	1.21 (4)	7.36 (4)	3.44 (3)			
1400	1008	412	3.08	2.82 (4)	3.93 (-9)	1.44 (-19)	8.69 (3)	1.95 (4)	1.71 (1)			
2000	1008	692	2.13	8.98 (3)	1.25 (-9)	3.18 (-20)	5.99 (3)	3.39 (3)				
4000	1008	2120	1.07	1.88 (3)	2.52 (-10)	3.34 (-21)	1.84 (3)	4.26 (1)				
6000	1008	3186	1.01	8.56 (2)	1.19 (-10)	1.43 (-21)	8.54 (2)	2.20				
10,000	1008	5637	1.00	3.10 (2)	4.31 (-11)	5.15 (-22)	3.10 (2)					

* Denotes $n = 1.04 \times 10^{13}$ particles cm⁻³

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